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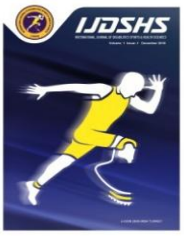

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REVIEW

Leisure and Recreation Activities for Disabled People

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Abstract

All regulations around us that are made for human needs are possible only through a good design and practice-integrity by covering all people and by considering all needs that emerge from such factors as age and physical conditions and that require a general and special sensitivity. In this sense, one of the most important issues in the transformation of recreational open areas into livable environment is the accessibility. This study basically aims at reviewing those studies that discussed restrictors that prevented the disabled people from accessing to recreational activities in urban areas. Therefore; a search was made by using such key words as recreation, leisure, disabled, physical activity and the relevant studies were studied in detail. As a result of the review, the most important factor that restricted the disabled people was identified. In light of the findings, such classifications as environmental and structural, psychological and emotional, economical and legal/procedural factors were explored. In sum, it was concluded that environmental and structural factors were the most restrictive factor for the disabled people. In order to eliminate these restrictors identified, recommendations were made with physical environment solutions.

Keywords
Recreation, Leisure, Disability, Physical Activity

INTRODUCTION

15% of the global population –namely, 1 billion- is consisted of people with disabilities. In the survey done by Turkish Statistical Institute, almost 9 million disabled individuals are estimated and this figure corresponds to nearly 13% of Turkish population. According to the figure, these disabilities included difficulties of vision, auditory, speaking, slower learning than peers, simple arithmetic calculation difficulties, memory/attention deficiencies and mobility difficulties (walking, carrying, holding and climbing up/down stairs). The survey put those expressing to have a big difficulty in -at least- one of these domains or did not succeed in any of these above- mentioned domains into the population with –at least- one disability (EYHGM, 2020).

According to the definition; disability covers those who have long physical, mental, cognitive or perceptional disorders appearing as a barrier to a complete and effective participation in society under equal terms (SUET). According to World Health Organization (WHO), disability is defined as a restriction or a lack of ability to perform normal activities manifested as behaviors, skills and tasks expected from body as a whole or humans or as a restriction of movements or inability to perform movements caused by a handicap or disability but expected from one according to gender, age, social and cultural factors (WHO 1980).

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According to the findings of Turkey Disability Survey; it is suggested that the disabled people's living under conditions away from normal life, normal educational and working areas and living dependent on others have been their "normal" and they have literally been isolated from the society in Turkiye. Aids, supports and services that will enable the disabled to lead a normal life should be different from each other. Disability is a social disadvantage caused by impairments occurring in physical functions and is a reason for social exclusion (Koçman & Tufan, 2005; Genç & Çat, 2013). Throughout human history, the disabled have been a part of society and have always been subjected to social exclusion and their social cohesion has been a topic of dispute in the society where they live. Exclusion from social life and inaccessibility to basic services, cultural and social activities, close social circles and economical fields are considered as a second disability for the disabled individuals. Therefore, social inclusion and integrity are critically important for the disabled people (Genç & Çat, 2013).

DISABILITY AND SOCIALIZATION

The disabled individuals have a restricted social life and leisure activities and physical activities physical activities are very effective in their socialization process. In particular, the number of those who play individual sports or team sports under the federations proves that most of the individuals with disabilities who participate in sportive activities are male individuals. Considering the positive effects of sports and physical activities upon socialization; they are more important socialization and leisure tools – especially- for the disabled (Erbas & Gumus, 2020; Güven et al., 2019). Sports and physical activities are regarded as a crucial tool for all individuals during the socialization process. In this sense, sports and physical activities are seen as ideal domains for socialization studies (Richard et al.,2015).

Disabilities restrict one's numerous activities in his/her daily life. They become interested in fewer productive and leisure activities and therefore, their social participation decreases. Thus, in our country it is necessary to maximize artistic, cultural and sportive activities to be performed by the disabled individuals or to be performed for the disabled individuals and to broadcast and to encourage these activities by mass media for their social inclusion (Akyürek, 2011). Participation in social life by disabled people will make them citizens with a feeling that they are a part of the society. During this process, such an external social environment should be built up so that disabled children can continue their education and physical activities in the outdoors and their families can rest and take a short break. "Eskişehir Recreation Park for the Mentally Disabled Children" is a good example of this objective.

This community service project with a recreation park for the mentally disabled children aimed at developing independent life skills of these children as well as creating an external social environment where their family members can rest and provided an opportunity to play with non-disabled children and thus, their integration, which played a crucial role in their mental development, was achieved (Öztürk, 2010). The parents with disabled children encounter problems like not being recognized by other families, communities, society, socialization difficulties and not being considered as an individual unlike those children with normal growth. These problems affect the disabled children and their parents negatively. A disabled child who has just joined the family or an individual who has later become a disabled person is a source of extra stress for the parents (Karakaş & Yaman, 2017).

THE EFFECT OF FAMILY AND ENVIRONMENT

Having a disabled child may affect the whole life in this period during which parents may delay or give up many things that they want to do and this negative exposure of parents accompanied by anxiety, depression and stress limits their basic psychological needs such as family's motivation to hold on to life, opportunities to get pleasure out of life and devotion and influences their quality of life negatively. Therefore; among the rehabilitation objectives should be the improvement of quality of health life of both the disabled individuals and those who provide care to the disabled individuals (Karakaş & Yaman, 2017).

Although it is known that physical activities show positive effects upon improving health and functioning among the disabled people, they still

continue to be one of the least active and the most obese populations in the society. A study done by the United States Center for Disease Control and Prevention revealed that nearly half of the disabled individuals are physically inactive and do not participate in any physical activity. The rate of having a chronic disease for the disabled people who cannot lead an active life style is more than 50% (James & Rimmer, 2019; Kaya & Sarı, 2018). A disabled individual who joins physical activities gets higher satisfaction from his/her life, feels more energetic, becomes stronger in personality and suffers less from secondary health problems (fever, cold, etc.) and the number of painful, depressed, anxious and sleepless days goes down, his/her expectation from life increases, his/her cardiovascular health and fitness is improved and his/her positive athletic identity develops.

Participation in any kind of sports gives positive contributions like getting satisfaction from life, performing activities of daily life in an entertaining manner and elevating positive interaction and quality of life. Additionally, it is argued that joining any physical activities or sports maximizes one's physical fitness as well as his/her independence. Also, the physically disabled people's participating in sports produces social outcomes (Aslan et al. 2017). Leisure activities have been a significant element in rehabilitation process for the disabled individuals. Thanks to leisure activities; these individuals elevate their sense of success, satisfaction, professional carrier, socialization, self-confidence, self-respect, making self-decision and level of sports ability (Munusturlar, 2016; Seviç & Eskiler, 2020). In the studies done with the disabled individuals who played sports and those who did not; it was identified that the disabled individuals who played sports demonstrated higher level of self-respect (Koçak, 2016; Aslan et al. 2017) and showed a positive socialization and significant difference in neurotic and behavioral problems (İlhan, 2010; Yancı, 2010) as compared to those disabled individuals who did not play sports.

In a study done with physically disabled and visually disabled individuals; when the rate of those who played sports and those who did not play sports was investigated, it was seen that the rate of those who played sports was bigger and attitudes of the disabled participants who played sports towards leisure activities were more positive (Kaya & Sarı, 2018). Besides; theses and articles written about physical activities of individuals with autism spectrum disorder (OSD) in Turkiye and the world between 2004 and 2014 were studied and it was identified that the most preferred physical activities were walking, swimming, cycling and trekking (Görgün & Melekoğlu, 2016).

Problems encountered by the disabled individuals in recreation areas cause them to keep away from social life and to lose self-confidence (Kaya & Sarı, 2018). Factors that complicate physical activity participation are computer games, watching TV, listening to music, feeling tired, lack of activity partner and parents' inability to find time (Isık et al., 2014). Factors that facilitate physical activity participation are preference for individual sports or couples sports like tennis, Wii sports, popular figures and interests, wish to get rewards and supports from friends and parents (Görgün & Melekoğlu, 2016).

As a result of the study done to determine the disabled individuals' barriers to participation in physical activities; these barriers were classified into two main themes: the first theme includes environmental factors: Social factors and lack of support from friends, family, society, partners or restrictive behaviors. Physical factors are associated with transportation difficulties, unsuitable and inadequate facilities and materials. The second theme includes individual factors: economic difficulties, disability status and psychological factors (Esatbeyoğlu & Karahan 2014).

Arrangement and organization of environmental conditions, which is one of the primary issues that affect the disabled individuals' activities in their free time, is important to achieving opportunities offered (Kaya & Sarı, 2018). In the study of Ayan and Ergin (2015); reasons of lower rate of participation in physical activities were examined among individuals with special needs. They concluded in the study that economic factors, poor transportation and lack of physical capacity were the common barriers to participation in physical activities.

Özer and Şahin (2010) reviewed reports of two workshops held between 2009 and 2010 and pointed out that the number of academic studies should be increased and legal regulations should be made so that physical activities for the disabled individuals can be improved as a profession, service and right in our country. Meanwhile; they emphasized that economical difficulties are the basic barrier for the disabled individuals to join physical activity programs, government policies are inadequate in physical activity participation, fees of activity programs and price of sports equipments are higher; which is considered as barriers to joining activities (Görgün & Melekoğlu, 2016; Kuripek et.al., 2017).

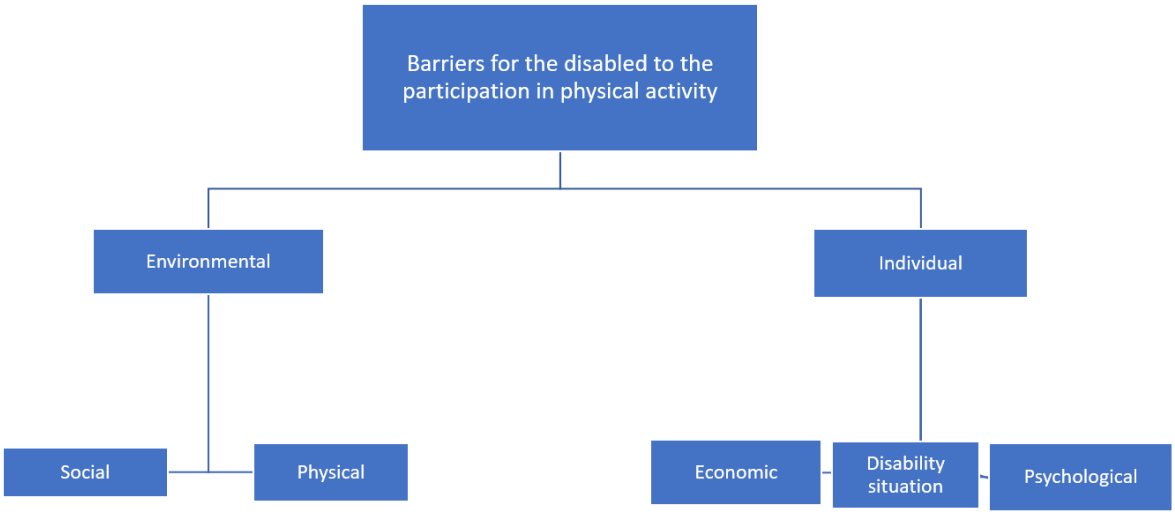

Figure 1: Themes that prevent the disabled individuals from joining physical activities (Esatbeyoğlu & Karahan, 2014).

DISCUSSION AND CONCLUSION

Benefits of physical activities are universal for all children including the disabled ones. Disabled children's participation in sportive and recreational activities promotes social inclusion and minimizes conditioning, optimizes physical functioning and increases general welfare. Despite these benefits; the disabled children are more restricted in participation, do not have enough competence and have higher level of obesity as compared to those non-disabled children (Toptaş Demirci, 2019; Ayyıldız & Gökyürek, 2016). Numerous situations similar to these appear as restrictions for the disabled people to benefit from recreational opportunities. Recreational opportunities, which offer people refreshment and renewal both physically and psychologically, are today a requirement –rather than a luxury or a free time activity. This requirement makes people to live their lives more energetically, socially and actively (Durhan & Karaküçük, 2017; Koçak et al., 2017). Considering the fact that disabled individuals suffer from many restrictions – particularly- in the developing countries even when they meet daily life needs, it may be argued that (answering) recreation needs are important necessity for them. According to the studies conducted, physical inactivity is seen 4.5 times more among the disabled individuals than non-disabled ones (Demirel et al., 2014; Yagmur et. al.,2020). Therefore; places where disabled individuals remain physically active are very important to their health. Among these places are parks and recreational areas and designing and building these places in line with accessibility conditions of the disabled people will improve their physical activity level considerably. Recreation areas play another key role not only in physical activity but also socialization of the disabled individuals. Recreation areas support and back social inclusion and integration of those disabled people who are socially isolated. According to the findings, the disabled individuals watch TV more than 4 hours a day; which is twice higher as compared to those non-disabled ones. It

is necessary for the disabled people to use recreation areas more actively for their social interaction.

As such, the following recommendations were made for local governors, law-makers and non-governmental organizations:

- Parks and recreation areas allocated to the disabled people according to their disability levels should be more accessible to the disabled people through mobile applications and smart technologies.
- Qualified personnel who will provide the disabled people with psychological support and encourage them to use recreation areas during their social integration process should be employed in recreation areas,
- Group exercise programs should be arranged in recreation areas for the disabled people on certain days of the week with qualified staffs,
- Public transport vehicles that run to recreation areas should be designed in a way that the disabled people can use them,
- Enough cultural and artistic activities should be organized for the disabled people in recreation areas,

It is recommended that taking disability classification and disability levels, different age groups and socio-economic status and factors into consideration; new studies should be done to understand problems of the disabled individuals more clearly.

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RESEARCH ARTICLE

Burnout Levels of Teachers Working In Special Education

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Abstract

Special education as a type of education involving the education of children whose development is slow compared to their peers and the ability to adapt to society, includes challenging processes for the child's family as well as its teachers. Determining the burnout levels of teachers working in the field of special education has been identified as the main goal of this research. Explanation of physical exhaustion, emotional exhaustion, mental exhaustion of teachers, determination of whether the teacher's views differ according to the domographic characteristics of the teachers are included in the scope of the sub-goals. The Maslach Burnout scale was used to collect data in this study, which is in the general screening model. The scale was applied to all special education teachers (142 teachers) working in the field of special education in schools in Eyüpsultan District of Istanbul province. 137 scales have returned. According to the results obtained, working in the field of special education, teachers generally have "some" level(X=2,63±of 0.38); in the dimension of emotional exhaustion: "sometimes" level (X=2,84 ± 0,49); mental exhaustion in the size of the "sometimes" level (X=2,68 ± 0,39); physical exhaustion in the size of "very rare" level (x=is 2.38 ± 0,64) were found to have employee burnout. It was found that the burnout levels of teachers differed according to age, gender, branch, type of institution studied, and duration of work in the field of special education.

Keywords
Special Training, Burnout, Teachers' Burnout

INTRODUCTION

Along with the developments in the field of education, the development of special education has gained positive momentum. As a result of the developments related to special education, special education has become a discipline in its own right and trainings have been given in the field of special education at the academic level. This point achieved by special education is one of the main factors in selecting such a subject of study.

Special education is a challenging process. Education of children who do not show Normal development will not occur only with education provided in school. For this reason, teachers in special education should carry out their work in a coordinated manner with the family. The existence of such a requirement increases the level of attrition of teachers working in the field of special education, as well as increases the level of difficulties encountered. In addition, in this process, the family's experiences with a child who needs special education inevitably affect teachers. All these are factors in preparing a study on this issue.

Stress is expressed as the disease of the modern age. The relationship between stress and this study is that people's work under intense stress increases the likelihood of burnout syndrome. The idea that teachers working in the field of special

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education will experience this situation more intensively brings about the effects of stress as well as burnout.

Burnout syndrome is described as a psychological problem that occurs with stress in the working environment and the continuation of similar conditions (Sağlam Arı and Çına Bal, 2008: 133). This aspect of burnout, in addition to its intense presence in working life, leads to its being in a position that affects employees emotionally, behaviorally and mentally. In the study, it is designed to focus on the reflections of burnout in working life in detail.

One of the biggest problems faced by today's employees is burnout. Along with the continuity of difficulties encountered in organizational processes, employees are more likely to develop burnout syndrome, and therefore there is an increase in the number of burnout research. In the research to be conducted, examples of the emergence and development of burnout will be given and the scope of the concept will be revealed. People's work environment, relationships with colleagues, workload, fair approach, rewards and personal values cause burnout and reveal the symptoms of burnout (Budak and Sürgevil, 2005: 97). Determining the factors that cause burnout of teachers working in the field of special education is one of the issues that cause the problem situation.

Burnout has negative effects on both individual and organizational levels in working life (Ardıç and Polatçı, 2008: 69). The negative effects of burnout, the fact that it is in a position to directly affect performance from the point of view of teachers working in an important area such as special education, are a structure that should be taken into account within the scope of the problem situation of the study. One of the important issues about burnout is the fight against burnout. With the belief that the most valuable asset in organizations is human resources, emphasis has begun to be placed on combating issues with negative effects such as burnout. Issues that should be considered at the individual and organizational level when combating burnout have been identified as one of the topics that the study will investigate.

In this study, which will be prepared with the aim of explaining the burnout levels of teachers working in the field of special education, the reflection of the difficulties encountered in special education on the lives of teachers was taken as the starting point. In the assessment, progress will be made by taking into account the impact of humanitarian challenges that teachers working in the field of special education face in addition to the challenges they face professionally. In this way, the burnout of teachers working in the field of special education will be demonstrated in a multifaceted form.

Teachers working in the field of special education are affected by what they face, and this is a decisive position in the emergence of a problem situation in the study. Reflection of teachers ' experiences in their own lives in processes related to special education constitutes a problem situation. The fact that teachers in the field of special education are affected by the situation in which special education students and their families are located creates a situation of problems.

The fact that the possible challenges are greater than in other branches is one of the important details in the scope of special education. Issues with negative content such as stress, burnout and anxiety are more common in k special education services (Bayrakdar, Vural Batık and Barut, 2015: 135). This, in turn, is a structure that should be considered for the scope and effects of special education. The scope of special education in terms of education-related processes is shown in Table 1 below (MFSPR,Turkey 2018).

According to the data in Figure 1.1, information must be activated first within the scope of special education. In the second stage, steps related to content editing are taken. Teaching terms and concepts are among the factors that should be known within the scope of special education. The fact that it contains information about how to follow a path in special education is a factor that increases the importance of the data contained in the above figure.

One of the issues that should be addressed within the scope of special education is the issue of inadequacy.

Table 1. Scope of Special Education

Activate Previous Information	Edit Content	Learning terms and concepts
Associate with previous information	Defining the main topics, activities. Presenting content outlines, providing preliminary information, etc.	Examples, synonyms and diversification of definitions
Consideration of previous information	Sequence of events, comparison, cause and effect relations	Distinguishing positive or negative examples
Deciding which information should be given priority	Creating a working guide	
	Using graphic and visual editing	

These deficiencies that shape special types of education are listed as follows (Karasu and Mutlu, 2014: 48)

i. Attention deficit and hyperactivity	vii. Specific learning disabilities
ii. Language and speech	viii. Autism
iii.Emotional and behavioral disorders	ix. Cerebral palsy
iv. Seeing	x. Continuum disease
v. Hearing	xi. Mental disabilities is shaped
vi. Orthopedics	

Deficiencies in the mentioned subjects are effective in clarifying the scope of special education. Each of these deficiencies is important separately, as they have a different effect on the final version of the scope of special education. Institutions operating in the field of special education are one of the determining factors related to the scope and effects of special education. As a newly developing area, the number of private educational institutions is not very large (Gündüz and Akın, 2015: 87). Private educational institutions, whose prevalence is not high, are an obstacle to the number of people reached by the effects of private education at the desired level. For this reason, the dissemination of special education institutions has to be one of the priority goals related to special education.

In Figure 1 (Tümeğ, 2014), the place and importance of teachers working in the field of special education in the special education process are discussed in two periods, before and after teaching. It includes the process of providing material control, attracting the attention of the student with special educational needs, telling what the topic to study works, determining the rules and rewards before teaching. In the teaching process, teachers working in the field of special education talk about the content in the form of teaching with simultaneous tips, giving correct reactions, not reacting according to their place. In terms of showing that teachers working in the field of special education continue to exist in different ways in special education processes according to the stage of education, these considerations must be taken into account.

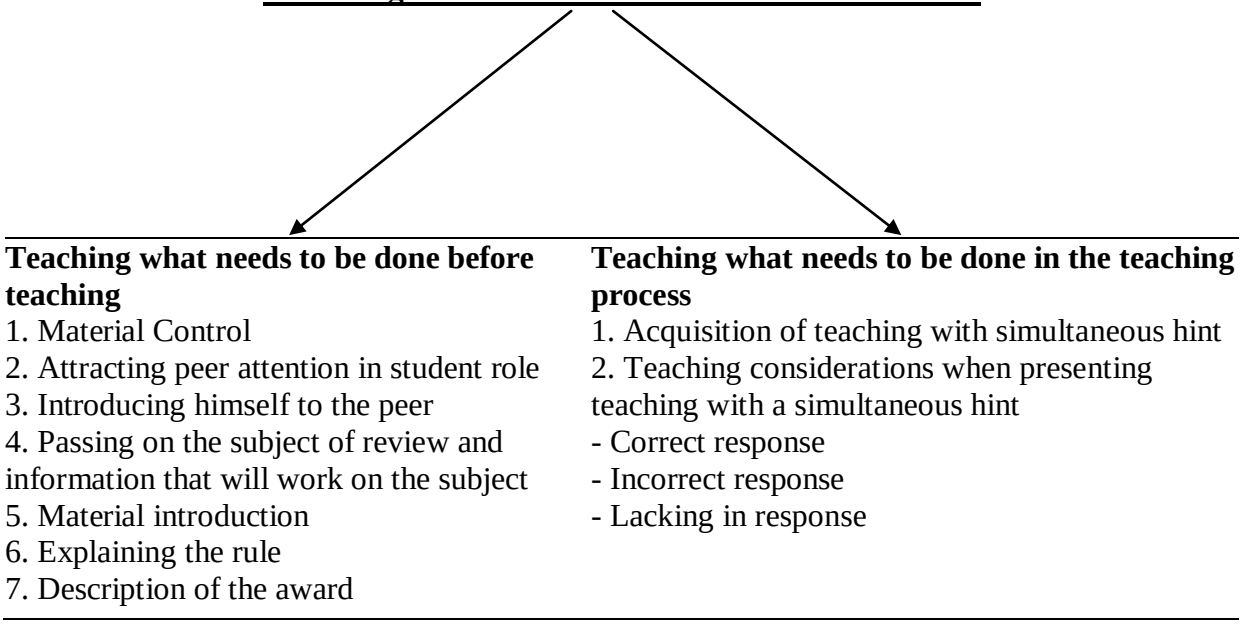

Figure 1. Main Roles Of Teachers In Special Education

"In our country, teachers working in special education institutions are considered special education teachers regardless of their educational status and branches" (Başaran, 2001: 41), while special education faculties should include graduates of the special education department, the program for teaching hearing, vision and mental disabilities. It is understood through these statements that there may be differences from country to country regarding the place and importance of teachers working in the field of special education in special education. However, it is seen that teachers working in the field of special education can work in many different areas in special education services.

Teachers working in the field of special education have to contribute to the development of students who are experiencing inadequacy. The difficulty of dealing with children with special educational needs stands out as a factor that complicates the task of teachers working in the field of special education (Başaran, 2001: 41). First, it is necessary to be aware that these teachers perform their duties with many difficulties when examining the duties of teachers working in the field of special education.

Competence in classroom management is one of the duties of teachers working in the field of special education. At this point, it is expressed that there is a need for support, especially for teachers of inclusion education (Akalin, 2015: 215). Although inclusion education teachers stand out a little more, this requirement applies to all teachers working in the field of special education. In order to increase the quality of special education, the competence of teachers working in the field of special education has a very important place in this regard.

Patience and dedication are among the duties of teachers working in the field of special education. The difficulties encountered in the process of providing education to children with special education needs significantly affect teachers working in the field of special education, but point out that they should be treated patiently and devotion should be shown throughout the process (Şahin and Şahin, 2012: 277).

Purpose of research

"To present the views of teachers working in the field of special education about the level of burnout; to determine whether the views of teachers differ according to the variables of gender, age, branch, type of institution, year studied in special education."arranged in the form.
In order to achieve this general goal, answers to the following questions have been sought.
1. What is the level of burnout of teachers working in the field of special education in the lower dimensions and in general?
2. Do the burnout situations of teachers working in the field of special education differ significantly by lower dimensions and gender in general?

3. Do the burnout situations of teachers working in the field of special education differ significantly depending on the lower dimensions and age in general?
4. Do the burnout situations of teachers working in the field of special education differ significantly depending on the lower dimensions and the branch in general?
5. Do the burnout situations of teachers working in the field of special education differ significantly depending on the lower dimensions and the type of institution they are in charge of in general?
6. Do the burnout situations of teachers working in the field of special education differ significantly depending on the lower dimensions and the year of work in the field of special education in general?

Importance of Research

People's changing lifestyles and the increasing structure of stress in human life have led to burnout being a more common structure. At the beginning of the elements that make up the importance of this research is the increase in the frequency of people experiencing burnout syndrome. From the point of view of teachers working in the field of special education, the interaction of the difficulty of educating special education students with burnout creates the scientific importance of the selected subject. The importance of the research is that teachers working in the field of special education will provide explanations on how to combat burnout. The focus on the level of difficulties and burnout faced by teachers working in the field of special education compared to other teachers is the distinctive aspect and importance of the research.

MATERIALS AND METHODS

This research is patterned on the general screening model for the study of burnout levels of teachers working in special education.

Participant

Teachers working in the field of special education working in special education centers and schools in Eyüpsultan District of Istanbul Province were included in the study. No sample was created in this study. The entire universe (142 teachers) had scales distributed, and 137 scales returned. Thus, the findings were obtained from 137 scale data returned.

Data Collection Tool

Scale was used as a means of data collection. The scale consisted of two parts. The first section to find some information about teachers ' age, gender, major, type of institution, and years of working in the field of special education for the variable “personal information form”, the second part is a Likert-type 5-choice questions 22 and Jackson Health literature (1981) was developed by and Capri (2006) adapted to Turkish by, 3 sub-dimensions of Burnout scale has been involved in the health literature. Plot 5, 8, 12, 14, 17, 21. questions emotional exhaustion, 3, 6, 9, 11, 15, 18, 19. questions mental exhaustion, 1, 4, 7, 10, 13, 16, 20. the questions are about physical exhaustion.

Statistical Analysis

In the study, the arithmetic mean(X) was used to determine the level of burnout. “Never” for 1.00-180, “very rare” for 1.81-2.60, “sometimes” for 2.61-3.40, “most of the time” for 3.41-4.20, “always” for 4.21-5.00 were used in the interpretation of the arithmetic mean.

Compliance with the normal distribution was tested using the Shapiro-Wilk-w test to determine whether the variables fit the normal distribution. Normal distribution results are shown in Table 2.

Table 2. Normality Test

	Shapiro-Wilk		
	Statistic	df	Sig.
Emotional exhaustion	0,977	137	0,019
Mental exhaustion	0,979	137	0,033
Physical exhaustion	0,981	137	0,049
Burnout (General)	0,989	137	0,351

As can be seen in Table 2, it was found that the group did not exhibit normal distribution according to the variables of emotional exhaustion, mental exhaustion and physical exhaustion. Since the group did not show normal distribution, the Mann Whitney –U test was used to compare two groups, and the Kruskal Wallis test was used to compare three and more groups. The Mann Whitney U test was performed to determine which groups had a significant difference in the Kruskal test.

It has been found that the group exhibits a normal distribution in the overall depletion size. Since the distribution is normal, the t-test for variables with two groups was used to analyze one-way variance (ANOVA) for variables with more than two groups. In order to determine the groups that cause the difference as a result of ANOVA, the homogeneity of the variances was first looked at using the Levene test. If the variances are homogeneous, the Schefe test was used, and if not, the Tamhane test was used.

RESULTS

The first teachers in the study of emotional, mental, physical dimensions and overall burnout levels of teachers in the continuation of tukenmislik of opinions about gender, age, branch, task carried institution, according to the variables of years of working in the field of special education was investigated and results showed significant differences are indicated by using tables.

Teachers ' Burnout Levels

Arithmetic ratios were calculated to determine the lower dimensions of teachers and their level of burnout in general. The findings are included in Table 3.

Table 3. Number, arithmetic mean and standard deviation values of Teachers ' views on Burnout

Bottom Size	Expression (article)	n	$\overline{\chi}$	ss
Emotional Exhaustion	2, return to work I feel spiritually exhausted.	137	2,32	0,87
	5, I realize that I treat some of the people I meet as if they are not people.	137	1,51	0,78
	8, I feel exhausted from the work I've done.	137	2,34	1,2
	12, I'm able to do a lot of things.	137	3,72	1,04
	14, I feel like I'm working too hard at my job.	137	2,81	1,31
	17, I create a comfortable atmosphere between me and the people I meet for my job.	137	3,28	1,01
	21, I approach emotional problems in my work with coolness.	137	3,41	1,03
	22, I feel that some of the people I encounter in my work are acting as if I created some of their problems.	137	1,88	0,89
	Bottom Size	**137**	**2,84**	**0,49**
Mental Exhaustion	3, when I wake up in the morning, I feel like I can't handle this job for another day.	137	1,92	1,05
	6, dealing with people all day is really exhausting for me.	137	2,45	1,01
	9, I believe that through the work I do, I contribute to people's lives.	137	3,9	1,09
	11, I'm afraid this job will make me harder and harder.	137	2,05	1,12
	15, I don't care what happens to the people I meet because of my job.	137	1,43	0,82
	18, I feel alive after working closely with people.	137	3,45	0,94
	19, I have had many notable successes in this business.	137	3,56	0,97
	Bottom Size	**137**	**2,68**	**0,39**
Physical exhaustion	1, I feel like I'm cooling off from my job.	137	2,08	0,92
	4, because of my job, I understand how the people I meet feel.	137	3,45	1,04
	7, I find the most appropriate solutions to the problems of the people I encounter in my work.	137	3,64	0,88
	10, I've been hard on people since I worked in this business.	137	1,96	0,92
	13, I feel like my work is holding me back.	137	2,4	1,3
	16, working directly with people puts a lot of stress on me.	137	2,47	1,01
	20, I feel like I'm at the end of the road.	137	1,75	1,07
	Bottom Size	**137**	**2,38**	**0,64**
Burnout (General)		**137**	**2,63**	**0,38**

Looking at the arithmetic averages in Table 3, teachers ' emotional exhaustion states were found to be greater than their mental and physical states. It turned out that the level of burnout was at the level of "sometimes" in the emotional and mental dimensions; at the level of "very rare" in the physical dimension; at the level of "sometimes"in general.

With the lowest arithmetic average of 1.51 in the sub-dimension of emotional exhaustion, "5, I realize that I treat some of the people I encounter as if they are not people."At the level of" None "in his statement and with the highest arithmetic average of 3.72 " 12, I am able to do a lot of things. It was found to be at the level of "most of the time" and at the level of "sometimes" with an average of 2.84±0.49 in the total score of the lower dimension.

With the lowest arithmetic average of 1.43 in the lower dimension of mental exhaustion, "15, I don't care what happens to the people I meet because of my job."At the level of" ever "in his statement and with the highest arithmetic average of 3.90, " 9, I believe I contribute to people's lives thanks to the work I do."It is included in the statement and is at the level of" most of the time "and the overall average score of the lower dimension is at the level of" sometimes " with an average of 2.68±0.39.

With the lowest arithmetic average of 1.75 in the lower dimension of physical exhaustion, "20, I feel like I've come to the end of the road." In the expression "Never," and at the highest level with the arithmetic average 3,64 "7, find the most appropriate solution to the problems of the people I encountered in my job I will," the statement is located in the "often" and at the level of sub-dimensions in total average score is 2.38±0,64 average "very rare" - size and level of burnout (in general) 2,63±average of 0.38 "sometimes" level.

Burnout Status Of Teachers By Gender

The Mann Whitney U test was performed to determine whether emotional, physical, and mental exhaustion states differ significantly by gender. The findings are included in Table 4.

Table 4. Results Of The Mann Whitney U Test By Gender Of Emotional, Mental And Physical Exhaustion Scores

		n	Rank Average	Sequence Sum	M.W.-U	p
Emotional exhaustion	Woman	111	64,14	7120,00	904,000	0,003*
	Man	26	89,73	2333,00		
Mental exhaustion	Women	111	65,41	7260,00	1044,000	0,027*
	Man	26	84,35	2193,00		
Physical exhaustion	Women	111	64,71	7183,00	977,000	0,009*
	Man	26	87,31	2270,00		

As can be seen in Table 4, The opinions of male and female teachers differ according to the gender variable in all three dimensions, emotional, mental, and physical states of exhaustion. In all three dimensions, it appears that male teachers are more likely to be in burnout than female teachers.

An Independent Group t-test was performed to determine whether general burnout conditions differ significantly by gender. The findings are in Table 5.

Table 5. t-Test results by gender of overall burnout scores

		n	x̄	ss	t	p
Burnout (General)	Women	111	2,58	0,37	-3,217	0,002*
	Man	26	2,84	0,39		

Looking at the arithmetic averages in Table 5, male teachers show more burnout than female teachers in general. Thus, both in general and in the three sub-dimensions, male teachers show more burnout than female teachers.

Burnout Status Of Teachers By Age

Teachers emotional, physical, mental exhaustion and burnout differ significantly by the age of the event to determine whether the three sub-dimension, Kruskal-Wallis h test, the general ANOVA was applied to determine whether the differ significantly by age of burnout status. The findings are included in Table 6 and Table 7.

Table 6. Kruskal Wallis Test Results By Age Of Teachers ' Views On Emotional, Mental And Physical Exhaustion

Bottom Size	Age Group (Year)	n	Rank Average	Sd	χ^2	p	Source Of Difference
Emotional exhaustion	18-23	13	37,58	4	16,141	**0,003***	24-29>18-23 30-36>18-23 45-51>18-23 52 years and older >18-23 24-29>45-51
	24-29	46	61,14				
	30-36	38	74,28				
	45-51	33	82,09				
	52 years and older	7	88,64				
	Total	137					
Mental exhaustion	18-23	13	42,77	4	12,368	**0,015***	30-36>18-23 45-51>18-23 52 years and older >18-23 24-29>45-51 30-36>45-51
	24-29	46	66,10				
	30-36	38	65,41				
	45-51	33	84,47				
	52 years and older	7	83,36				
	Total	137					
Physical exhaustion	18-23	13	29,65	4	22,525	**0,000***	24-29>18-23 30-36>18-23 45-51>18-23 52 years and older >18-23 24-29>30-36 24-29>45-51
	24-29	46	60,16				
	30-36	38	77,76				
	45-51	33	83,03				
	52 years and older	7	86,43				
	Total	137					

Looking at the "p" values in Table 6, Teacher burnouts in the lower dimensions of emotional, mental, physical exhaustion differ significantly according to the age groups of teachers($p<.05$). Looking at the source of the difference in the size of emotional exhaustion, it was found that the emotional exhaustion States of teachers aged 24-29 years, 30-36 years, 45-51 years and 52 years and older were higher than the emotional exhaustion States of teachers aged 18-23 years. In addition, it was found that the emotional exhaustion States of teachers aged 24-29 years were higher than the emotional exhaustion States of teachers aged 45-51 years.

Looking at the source of the difference in the size of mental exhaustion, it was found that the mental exhaustion States of teachers aged 30-36 years, 45-51 years and 52 years and older were higher than the mental exhaustion States of teachers aged 18-23 years. In addition, it was found that the mental exhaustion States of teachers aged 24-29 years and 30-36 years were higher than the mental exhaustion States of teachers aged 45-51 years.

Looking at the source of the difference in the size of physical exhaustion, it was found that teachers aged 24-29 years, 30-36 years, 45-51 years and 52 years and older had higher physical exhaustion conditions than teachers aged 18-23 years. In addition, it was found that teachers 24-29 years of age had higher physical exhaustion than teachers 30-36 years of age and 45-51 years of age.

Table 7. ANOVA results of teachers ' views on general burnout by age

Age Group (Year)	n	$\bar{\chi}$	ss	ANOVA results						LSD
				Source of variance	Sum Of Squares	sd	Squares Average	F	p	Source Of Difference
18-23	13	2,20	,34	Within group	4,019	4	1,005	8,265	**0,000***	24-29>18-23 30-36>18-23 45-51>18-23 52 years and older >18-23
24-29	46	2,55	,28	Inter groups	16,050	132	0,122			
30-36	38	2,67	,31	Total	20,069	136				
45-51	33	2,81	,45							
52 and above	7	2,81	,43							
Total	137	2,63	,38							

Looking at the “p” value in Table 7, it is seen that there is a significant difference between teacher opinions relative to the age variable in relation to the general burnout of teachers. Looking at the source of the difference, it was found that the general burnout conditions of teachers aged 24-29 years, 30-36 years, 45-51 years and 52 years and above were higher than the general burnout conditions of teachers aged 18-23 years.

Thus, both the emotional, mental, physical sub-dimensions and the burnout of teachers in general differ significantly depending on the age variable. It was revealed that the source of the difference was predominantly the 18-23 age group. This age group shows less burnout than other groups with an older age.

Burnout Status Of Teachers By Branch

In order to determine whether teachers ' emotional, physical, and mental burnout states differ significantly by branch, the Kruskal Wallis h test in three sub-dimensions and Anova were applied to determine whether general burnout states differ significantly by branch. The findings are included in Table 8 and Table 9.

Table 8. Kruskal Wallis Test Results Of Teachers ' Views On Emotional, Mental And Physical Exhaustion

Bottom Size	Branch	n	Rank Average	Sd	χ^2	p	Source Of Difference
Emotional exhaustion	Pre-school teaching	24	66,38	4	6,021	0,198	
	Special education teaching	52	67,68				
	Classroom teacher	20	86,55				
	Child Development and Education Teacher	15	55,00				
	Another	26	68,63				
	Total	137					
Mental exhaustion	Pre-shool teaching	24	61,96	4	4,183	0,382	
	Special Education teaching	52	66,31				
	Classroom teacher	20	83,55				
	Child Development and Education Teacher	15	74,77				
	Another	26	66,37				
	Total	137					
Physical exhaustion	Pre-school teaching (1)	24	77,27	4	14,947	**0,005***	1>4 3>2 3>4 3>5
	Special education teaching (2)	52	66,82				
	Classroom teacher (3)	20	93,83				
	Child Development and Education Teacher (4)	15	48,53				
	Another (5)	26	58,44				
	Total	137					

Looking at the "p" value in Table 8, teachers ' burnouts differ significantly in the lower dimension of physical exhaustion. Looking at the source of the difference, it was found that the physical attrition status of classroom teachers working in special education is higher than the physical attrition status of teachers working in special education teaching, Child Development and education teacher and other branches. It has also been found that the physical attrition States of preschool teachers are higher than the physical attrition States of Child Development and learning teachers.

Table 9. ANOVA Results of Teachers 'Views on General Burnout by Branch

Branch	n	$\bar{\chi}$	ss	ANOVA results						LSD
				Source of variance	Sum Of Squares	sd	Squares Average	F	p	Source Of Difference
Pre-school teaching(1)	24	2,64	,29	Within group	1,949	4	,487			
Special Education teaching (2)	52	2,60	,32	Inter groups	18,120	132	,137			
Classroom teacher (3)	20	2,88	,55	Total	20,069	136		3,549	**0,009***	**3>4** **3>5**
Child Development and Education Teacher (4)	15	2,44	,40							
Another(5)	26	2,58	,33							
Total	137	2,63	,38							

Looking at the "p" value in Table 9, it seems that the overall burnout levels of teachers differ significantly according to the branch variable. Looking at the source of the difference, it was found that the general burnout conditions of classroom teachers working in the field of special education were higher than the general burnout conditions of Child Development and education teachers and other teachers. Thus, in the physical attrition and general attrition dimensions, the attrition status of classroom teachers working in the field of special education is higher than that of teachers working in special education who are outside themselves.

Burnout Status Of Teachers By Type Of Institution

Teachers ' emotional, physical, mental Burnout made the task of the state, show significant differences according to the type of institution to determine whether the three sub-dimension, Kruskal-Wallis h test, the general made the task of the state of burnout, ANOVA show significant differences according to the type of institution to determine whether it was applied. The findings are in Table 10 and table 11.

Table 10. Kruskal Wallis Test Results By Institution Type Of Teachers ' Views On Emotional, Mental And Physical Exhaustion

Bottom Size	Studied Institution	n	Rank Average	Sd	χ^2	p	Source Of Difference
	Rehabilitation (1)	31	84,42				
	Special education class (2)	17	66,68				
	Special education school (3)	65	58,75	3	10,021	**0,018***	1> 2
	OÇEM(4)	23	75,93				
	Total	136					
	Rehabilitation	31	81,61				
	Special education class	17	69,29				
	Special education school	65	61,75	3	5,452	0,142	
	OÇEM	23	69,33				
	Total	136					
	Rehabilitation (1)	31	94,60				
	Special education class (2)	17	67,65				
	Special education school (3)	65	56,38	3	19,878	**0,000***	1> 2, 4
	OÇEM(4)	23	68,20				
	Total	136					

Looking at the "p" value in Table 9, teachers ' burnouts differ significantly in the sub-dimension of emotional and physical exhaustion. Looking at the source of the difference in the size of emotional exhaustion, it seems that the burnout of teachers working in rehabilitation centers is greater than the burnout of teachers working in special education classes. Looking at the source of the difference in the size of physical exhaustion, it seems that the burnout of teachers working in rehabilitation centers is higher than the burnout of teachers working in special education classes and the burnout of teachers working in OÇEM.

Table 11. ANOVA results of teachers ' views on general burnout by institution type

Studied Institution	n	$\bar{\chi}$	ss	ANOVA results						LSD
				Source of Variance	Sum of squares	sd	Squares average	F	p	Source of Difference
Rehabilitation (1)	31	2,85	,35	Within group	2,672	3	,891	6,761	**0,000***	1> 2
Special education class (2)	17	2,64	,49	Inter groups	17,387	132	,132			
Special education school 3)	65	2,50	,33	Total	20,059	135				
OÇEM(4	23	2,66	,38							
Total	136	2,63	,39							

Looking at the "p" value in Table 11, it seems that the overall burnout levels of teachers differ significantly according to the institution type variable. Looking at the source of the difference, it was found that the general burnout conditions of teachers working in rehabilitation centers were higher than the general burnout conditions of teachers working in special education classes. In summary, emotional exhaustion, physical exhaustion and general exhaustion dimensions of teachers working in rehabilitation centers are higher than other teachers.

Burnout Status Of Teachers By Year Of Study In Special Education

In order to determine whether teachers ' emotional, physical, and mental burnout states differ significantly from the year of study in special education, the Kruskal Wallis h test in three sub-dimensions and Anova were applied to determine whether general burnout states differ significantly from the year of study in special education. The findings are included in Table 12 and table 13.

Looking at the "p" value in Table 12, teachers ' burnouts differ significantly in the sub-dimension of emotional, mental and physical exhaustion. Looking at the source of the difference in the size of emotional exhaustion, it seems that the burnout of teachers with a working time of 1 year in the field of special education is significantly less than the burnout of teachers with a working time of 5-8 and 9-12 years in the field of special education.

The difference in size when looking at the source of the mental exhaustion of special education teachers in the field of mental tukenmislik have an operating time of less 9-12 years and more working years was significantly higher than all the other teachers, it was revealed that mental tukenmislik. In addition, the mental burnout of teachers with a working time of 5-8 years in the field of special education is significantly higher than the mental burnout of teachers with a working time of 2-4 years.

Looking at the source of the difference in physical attrition size, teachers with 9-12 years of working time in special education have significantly more physical attrition than teachers with 0-1 years, 2-4 years, 5-8 years of working time. At the same time, teachers with 5-8 years of working time in special education have significantly more physical attrition than teachers with 2-4 years of working time.

Table 12. Kruskal Wallis Test Results Of Teachers ' Views On Emotional, Mental And Physical Exhaustion By Year Of Study In Special Education

Bottom Size	Year Of Study In Special Education	n	Rank Average	Sd	χ^2	p	Source Of Difference
Emotional exhaustion	0-1 year	38	50,78	4	16,433	**0,002***	5-8 > 0-1 9-12 > 0-1
	2-4 year	43	66,21				
	5-8 year	31	83,66				
	9-12 year	16	87,56				
	13 years and over	9	75,78				
	Total	137					
Mental exhaustion	0-1 year	38	62,57	4	24,267	**0,000***	9-12>0-1 9-12>2-4 9-12>5-8 9-12>13 years and over 5-8>2-4
	2-4 year	43	55,10				
	5-8 year	31	73,90				
	9-12 year	16	110,00				
	13 years and over	9	72,78				
	Total	137					
Physical exhaustion	0-1 year	38	51,99	4	23,363	**0,000***	5-8>2-4 9-12>0-1 9-12>2-4 9-12>5-8
	2-4 year	43	63,45				
	5-8 year	31	75,21				
	9-12 year	16	106,03				
	13 years and over	9	80,11				
	Total	137					

Table 13. ANOVA results of teachers ' views on general burnout by year of study in the field of Special Education

Year Of Study In Special Education	n	$\bar{\chi}$	ss	ANOVA results						LSD Sonuçları
				Source of variance	Sum Of Squares	sd	Squares Average	F	p	Source Of Difference
0-1 year	38	2,45	,34	Withingroup	4,725	4	1,181	10,163	**0,000***	9-12>0-1 9-12>2-4 9-12>5-8 9-12>13 years and over
2-4 year	43	2,55	,34	Inter groups	15,344	132	,116			
5-8 year	31	2,71	,29	Total	20,069	136				
9-12 year	16	3,06	,40							
13 years and over	9	2,68	,43							
Total	137	2,63	,38							

Looking at the “p” value in Table 13, it seems that the overall burnout levels of teachers differ significantly in the field of special education compared to the variable of the working year. Looking at the source of the difference, it was found that the general burnout conditions of teachers with a working period of 9-12 years in the field of special education were higher than the general burnout conditions of all other teachers with fewer and more working years in the field of special education.

In summary, it turns out that teachers with 9-12 working years in special education in the sub-dimensions of emotional exhaustion, mental exhaustion, physical exhaustion, and general exhaustion have significantly higher depletion States than other teachers. In addition, teachers with 5-8 years of work in special education have more burnout than the group with 0-1 years of work in the emotional burnout dimension, and the group with 2-4 years of work in the mental burnout dimension.

DISCUSSION

Teachers ' emotional exhaustion states were found to be greater than their mental and physical states. It turned out that the level of burnout was at the level of "sometimes" in the emotional, mental sub-dimensions and general dimension; at the level of "very rare" in the physical dimension. Kaya, Kaya, Ayık and Uygur'un (2010) research results showed that the average overall depletion score of nurses was 3.46±0.68 and that nurses experienced moderate burnout, nurses experienced the most physical burnout (3.78±0.85), followed by mental (3.66±0.54) and emotional (2.93±1.03) exhaustion. Compared to these two findings , teachers showed less burnout in the physical field than nurses, which can be interpreted as teaching being less strenuous than nursing.

According to the gender variable, male teachers appeared to have higher levels of burnout than female teachers. Emotional, mental, burnout in male teachers more than female teachers in the physical dimensions and overall size of the situation, the challenges male teachers than female teachers in the fight can be interpreted as being superior and more successful. Looking at the source of the difference in the size of emotional exhaustion, it seems that the burnout of teachers with a working time of 1 year in the field of special education is significantly less than the burnout of teachers with a working time of 5-8 and 9-12 years in the field of special education.

Emotional, mental, physical dimensions and overall size there are significant differences between different groups, although in the age group of 18-23 years, the most obvious difference with burnout more than teachers less than the teachers themselves show. In other words, older teachers are more in burnout than younger teachers. It can be interpreted as a natural result that teachers who are advancing age show more burnout than young people due to occupational fatigue. Depending on this finding, as I mentioned in the recommendations, the flexibility of working hours and early retirement rights of older teachers can make them work more efficiently. A study of Kaya, Kaya, Ayık and Uygur (2010) found that nurses aged 25 and six and 26-33 years had a higher level of emotional and physical exhaustion than nurses aged 42 years and older. It was found that there was no significance at the level of mental exhaustion. A study by Yıldıztaşı (2017) found that secondary school teachers ' views on the sub-dimensions of emotional, mental, and physical exhaustion did not show statistical significance compared to the age variable. Dinç (2018) showed that with the increasing age of teachers working in the field of special education, their experience also increases, as a result of this, their subjective well-being improves and professional burnout decreases.

It was found that the general burnout conditions of teachers also differed depending on the age variable (F=8,265, p=0,000 < 0,05). Looking at the groups that caused the significance, it was found that the 18-23 age group showed less burnout than teachers who had more age than themselves. In other words, teachers who are older show more burnout than young people. A study of Kaya, Kaya, Ayık and Uygur (2010) found that nurses aged 25 years and under and 26-33 years experienced higher attrition than nurses aged 42 years and older. A study by Kumcağız, Demir, Karadaş (2017) found that there was a negative low-level significant association between the age of school psychological counselors and burnout levels, and it was found that burnout scores decreased as participants ' ages increased. A study by Yıldıztaşı (2017) found that secondary school teachers had similar burnout levels according to their age. Teachers ' depletion states differed significantly only in the physical sub-dimension and overall dimension according to the branch variable.

Teachers differ according to the branch variable, the difference in the state of physical exhaustion of looking at the source when the status of the physical exhaustion of the classroom teacher, special education teacher, Child Development and education teachers and teachers in other disciplines, it was determined that the state of physical exhaustion were high. In addition, it was found that the physical attrition States of preschool teachers are higher than the physical attrition States of Child Development and learning teachers. Looking at the differentiation state of the general burnout States of teachers according to the branch variable, it was found that the general burnout States of classroom teachers are higher than the general burnout States of Child Development and education teachers. As a result, teachers who are classroom teachers and work in

the field of special education have been in a lot of burnout compared to other teachers, both physically and in general burnout. Classroom teachers ' work in a field that is more difficult than their field in terms of work difficulties may have caused their burnout to be high.

According to the type of institution in which teachers work, their burnout significantly differs from the sub-dimensions of emotional and physical exhaustion and the overall burnout size. Teachers working in rehabilitation centers in all three areas have more burnout than teachers working in special education classes and teachers working in the lower dimension of physical exhaustion, as well as in OÇEM. Because the working conditions in rehabilitation centers were more severe than in other areas, teachers working here showed more burnout than teachers working in other areas of special education. Teachers ' burnouts differed significantly in the sub-dimensions of emotional burnout, mental burnout, physical burnout, and overall burnout size according to the study year variable in the field of special education. In particular, teachers with a working time of 9-12 years show more burnout in the field of special education than teachers with less working time than themselves.

In other words, teachers with 9-12 years of working time in the field of special education are in more burnout than teachers with fewer years of working in the field of special education than they are. In other words, teachers with a lot of working Years exhibit more burnout than teachers who are younger than them. Because the resistance of these teachers to difficult working conditions decreases as the year progresses. A study of Kaya, Kaya, Ayık and Uygur (2010) found that nurses working in the same institution for 3 years and six to 4-7 years had a higher level of emotional and physical exhaustion than nurses working in the same institution for 12 years and above. It was found that there was no significance at the level of mental exhaustion. A study by Yıldıztaşı (2017) found that the views of secondary school teachers on the sub-dimensions of emotional, mental and physical exhaustion were not statistically significant compared to the study year variable in the institution. Gönüldaş (2017) found that teachers orking in special education for more than 10 years had higher burnout levels. The researcher also concluded that the teachers with the lowest level of burnout were teachers who worked in special education for 7-9 years.

Looking at whether the general burnout conditions of teachers differ according to the working year variable in special education, it was found that the general burnout conditions of teachers working for 9-12 years in special education were higher than the general burnout conditions of teachers working for 0-1, 2-4, 5-8 years and 13 years and above. Teachers who have more than a year of work in the field of Special Education show more burnout than young people, which can be interpreted as a decrease in their resistance to difficult working conditions. The fact that teachers with more working years show more burnout than teachers with more working years can also be interpreted as desensitizing teachers with more working years, being in learned helplessness. A study of Kaya, Kaya, Ayık and Uygur (2010) found that nurses working in the same institution for 3 years and six to 4-7 years had higher burnout than nurses working in the same institution for 12 years and above. A study by Yıldıztaşı (2017) found that the views of secondary school teachers on burnout were not statistically significant compared to the variable of the year of study in the institution.

CONCLUSION

Special education is an area of education aimed at educating children whose development is not at a normal level and living smoothly in society. The special educational needs of children who develop more slowly than their peers arise based on genetic, social, psychological and educational factors. The increasing trend of the need for special education has also led to an increase in research on teachers working in this field. Burnout, which occurs as a negative result in stressful and difficult business life, is a significant threat due to the impact of various difficulties encountered in the field of special education.

In this study, which involved 142 teachers working in special education in Eyüpsultan District of Istanbul province, the burnout levels of teachers working in special education and the difference of burnout according to age, gender, branch, type of institution studied, year of work in special education were investigated. The results obtained in the study can be stated as follows:

It reveals that teachers sometimes tend to burn out. This conclusion has been reached as a result

of separate investigations in terms of physical exhaustion, mental exhaustion and emotional exhaustion.

1) Emotional exhaustion States of teachers were found to be greater than their mental and physical states. It turned out that the level of burnout was at the level of "sometimes" in the emotional, mental sub-dimensions and general dimension; at the level of "very rare" in the physical dimension.

2) According to research results conducted in terms of gender and teacher burnout, male teachers have a higher level of burnout than female teachers.

3) According to the results of the research on the relationship between burnout and age of teachers working in the field of special education, it was determined that the burnout levels of teachers in the 18-23 age range were the lowest. A higher level of burnout in other age groups than in this age group indicates that the likelihood of burnout increasing is higher as age increases.

4) In the research conducted on the branch variable, no differences were observed in the states of emotional exhaustion and mental exhaustion of teachers, and differences were observed in accordance with the state of physical exhaustion. According to the results obtained, it was found that the physical attrition conditions of classroom teachers working in the field of special education are higher than the physical attrition conditions of special education teachers working in special education, child development and education teachers and teachers from other branches. In addition, it was found that the physical attrition States of preschool teachers are higher than the physical attrition States of Child Development and learning teachers. In addition, it was found that the general burnout status of classroom teachers is higher than the general burnout status of Child Development and education teachers.

5) According to the examinations conducted to determine whether the working conditions of teachers in institutions such as special education class, special education school, rehabilitation, autistic children education center affect burnout, the type of institution studied affects the level of burnout. Such a result occurs because different types of institutions require different special educational skills and each has its own unique challenges.

6) Similarly, the year teachers work in the field of Special Education reveals significant effects on burnout. Accordingly, teachers who work in the field of special education for 5-8 years have higher emotional exhaustion than teachers who work for 0-1 years. It shows that teachers working for 9-12 years in the field of special education have a higher state of emotional exhaustion, mental exhaustion, physical exhaustion and general burnout than teachers working for 0-1, 2-4, 5-8 years. Similar to the age variable, with increasing study time, teachers ' burnout levels also increase. The fact that the burnout levels of teachers serving in the 0-1 year range are lower than those of other teachers suggests that the two results support each other.

According to the results of the research, the following are recommended:

1. In our research findings, burnout appeared to increase as age progressed and occupation seniority increased. As for this finding, teachers working in the field of special education should be shown flexibility due to the share of attrition factor; improve working hours as part of flexibility, offer opportunities such as summer holidays and semester holidays, and. it is recommended that the opportunity for early retirement be offered will be important.
2. It has been revealed that male teachers show significantly more burnout than female teachers. Accordingly, men who choose to work and become teachers in the field of special education are recommended to consider aspects such as patience, tolerance towards the disabled, and empathy.
3. A study of the branch found that teachers with primary school teacher backgrounds had more burnout. According to this finding, it is recommended that teachers of primary education origin be careful in their appointment in the field of special education; those who are not patient and do not have empathy and tolerance towards the disabled should not be appointed.
4. Another finding in the study was that teachers working in a rehabilitation center had higher burnout levels. Accordingly, it is appropriate for teachers working in rehabilitation centers to show work flexibility, reduce working hours, increase vacation and rest periods, and recognize early retirement.
5. It is recommended to conduct research aimed at uncovering the burnout levels and causes of teachers working in other fields.

6. In order to contribute to the determination of the causes of burnout, it is recommended that teachers working in the field of special education conduct interviews with the families of children.

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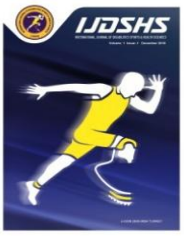

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RESEARCH ARTICLE

The Investigation of Acquisition Sufficiency of Physical Education Lesson Aims in A Special Education School in Turkey: A Pilot Study

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Abstract

The aim of this study was to examine the acquisition sufficiency of physical education lesson goals with the help of Eurofit Test Battery. The study included 41 students with moderate and severe intellectual disability (ID) (9 female, 32 male and 29 mentally retarded, 6 down syndrome (DS) and 5 autism) who were studying at Recep Birsin Özen Special Education School in Erzurum in Turkey. Physical education lessons were conducted an hour for a day and two days for each week during eight weeks. Before and after 8 weeks of study, Eurofit Tests were applied after measuring the height and the weight of the students. Data were compared in Spss 20 statistics program at $p<0.05$ level. In Eurofit Test parameters of the students with moderate and severe ID; it was found a difference statically in pre-test-post-test comparisons of flamingo balance, plate tapping, sit-up, sit and reach, standing broad jump and 10x5 metre shuttle run. In the physical education and sports classes, the goals chosen according to the students' level improved the physical capacities of the students. The individual goals chosen for the students in the special education school affiliated to the Republic of Turkey Ministry of National Education contributed to the development of balance, fastness, leg strength, upper body movement speed and flexibility of the students and did not only contribute to the development of hand strength, arm strength and abdominal muscle strength of the students. The results of our study and the results of previous studies are parallel.

Keywords
Eurofit Test Battery, Intellectual Disability, Physical Education and Sport, Special Education

INTRODUCTION

It is known that sport is a tool that supports the muscular and nervous system, mental and physical reactions of humans, physiological and metabolic development of the body. It is emphasized that physical activities have a kind of rehabilitation feature (Beasley, 1982).

Sport is an important activity to get rid of the physical and mental stress of the individuals under the heavy burden of societal life and to physically harmonize with the life conditions (Yüksel, 2018).

One of the most effective assistance for the development of individuals with ID is special education services (Yörükoğlu, 2000). For individuals who are normally developing, special physical education and sport programs in special education services are as necessary as physical

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education and sport in general education (İlhan, Kırımoğlu, Tunçel, & Altun, 2015).

Purposeful-meaningful and regular-shaped movement programs affect all areas of development of the individuals with ID. The term movement includes sports, dance, exercise, and exploratory movements (Kınalı, 2016). The movement motivations of all individuals are in this direction. These experiences gained through movement should not be perceived as a goal alone, but as a fundamental instrument of growth and development.

One of the important educational supports affecting the growth and development of the individuals with ID is physical education programs in which movement skills are gained. There may be various difficulties in implementing these programs. Active participation in such activities may not be possible due to lack of appropriate areas, inadequate materials and lack of expert teachers in the field. In spite of all the difficulties, physical education programs which we believe make a great contribution to all areas of development of individuals should definitely be implemented.

Sport makes individuals fit physically and spiritually (Ersoy, 2004). Sport - especially group sport - is one of the most important supporters of the child's body, mind and social development. In addition to the purpose of maintaining and supporting the healthy situation of sport, it can also serves as a treatment to contribute to the discharge of physical energy and emotion tension (Yalçın & Akkuş, 2006)

Talents-skills and performance tests and achievement and progress in physical education allow the following-up and grouping of developments within a specific program. As students see their progress in the program, their desire for the program increases. In addition to allowing students and athletes to be classified according to their ability in all activities, special sport branches also allow groups to be matched in school or classroom competitions (Gündüz, 1997). It becomes possible to measure the progress regarding education of students.

It is thought that it may be useful to applicate Eurofit Tests in individuals with different ages to determine healthy living and nutritional conditions, to obtain regular physical activity routine, to provide physical education teachers and coaches with information about the formation-functional characteristics of individuals, to determine universal guidelines about individuals in physical education and sport (Zorba et al., 1995).

In a research by Golubovic et al. (2012) that examined the effects of carefully designed physical exercise programs on the development of physical fitness in children with ID, all the participants were assessed using Eurofit Test Battery. In research by Giagazoglou et al. (2013) physical fitness testing included the use of the following three different physical fitness tests derived from the Eurofit Test Battery, that has been previously applied to individuals with ID and found to be a reliable instrument for adolescents with and without ID. Children with ID can be successful in physical education and sports together with their peers without disabilities when the lucubratory skills are modified. (Sirinkan, 2018). In a research by Sirinkan and Saraçoğlu (2017) for measuring the students' physical parameters improved Eurofit tests for the disabled were used. Eurofit Tests were used in a research by Demirel and Sirinkan (2018) that aimed to search the effect of "Special Activity Education Program" applied in Special Education Rehabilitation Centers.

In a research by Virgil at al. (2015) Plate Tapping test from Eurofit Battery was used to measure repetition speed skill of visually impaired pupils. In another research by Van der Niet et al. (2014) that evaluated the physical activity and physical fitness levels of 8–11 year old children with developmental language disorders and compared this to typically developing age and gender matched controls, physical fitness was measured using five tests of the Eurofit test battery (standing broad jump, sit-ups, handgrip, 10x5 m shuttle run, and the 20 m shuttle run test). In a research that aims to investigate the physical fitness norms of male and female students in the groups aged 3-6, 25-meter speed, flamingo balance test, plate tapping test, flexibility, standing long jump, grip strength, 30 second shuttle, 30 second push-up, vertical jump, 10x5 meter shuttle run tests from Eurofit test battery were applied (Demirel, Sirinkan, & Sirinkan, 2016)

In another research on individuals with ID by Salaun and Berthouze-Aranda (2012), Eurofit test battery was applied to Eighty-seven French ID adolescents. In another research on individuals with DS by El et al. (2020), it was aimed to investigate the relationship between physical

activity levels and the Body Mass index of children with DS and the physical activity was measured with the Eurofit battery. In a research on trainable mentally disabled elementary school students by Kaya et al. (2018), selected Eurofit tests were used to investigate the effect of motion training. In the light of all this information; the aim of this study was to examine the acquisition sufficiency of physical education lesson goals with the help of Eurofit Test Battery.

METHODS

Participants

Ethics committee approval was received from the Sub-Ethics Committee of the Faculty of Sport Sciences in Atatürk Universty before the study with the decision number 2016.8.5 / c dated 01.03.2016. The population of the study consisted of students with moderate and severe ID in the 11-17 age group studying at Recep Birsin Özen Special Education School in Erzurum Province in Turkey. The sample group of the study consisted of 41 (forty-one) female and male students (11-17 years old) studying at Recep Birsin Özen Special Education Center and attending physical education classes.

Data Collection Process

Physical fitness of children was evaluated applying the Eurofit Physical Fitness Test Battery (1993). The Eurofit Physical Fitness Test Battery is a set of nine physical fitness tests covering flexibility, speed, endurance and strength. The standardized test battery was devised by the Council of Europe. The test is designed so that it can be performed within 35–40 min, using very simple equipment. Research by Tsigilis, Douda, and Tokmakidis (2002) indicated high reliability of this battery in general population of children, whereas adequate reliability was confirmed when applied to mild ID or individuals without ID (Golubovic, Maksimovic, Golubovic, & Glumbic, 2012).

Eurofit Test Batteries were applied in the gymnasium of Recep Birsin Özen Special Education School where the students received training. Data were recorded with “Subject Test Follow-up Form”. The necessary information about the measurement tool and the procces of the test were given to the students before the tests. The materials used in the tests were introduced. The students were encouraged to be motivated during the test process. Before the students participated in the tests, health checks were made and necessary precautions were taken. Before the tests, the students were not included in any warm-up movement regarding the rules of application of Eurofit Test Batteries.

Test Methods

The materials used in the tests were prepared in accordance with the instructions shown in Eurofit Test Batteries rules. The ages of the students were noted in accordance with their identities. The Casio stopwatch which has one percent accuracy of a second was used to measure time. Hand grip strength measurements of the students were made with the help of Tekzen (Home Model: EH101 Electronic Hand Dynamometer) brand dynamometer. For other length measurements, 1 meter iron measurement tool was used.

Eurofit test battery includes the following;

- flamingo balance test which is a single leg balance test;
- plate tapping–tests which measure the speed of limb movement;
- sit-and-reach-flexibility test (using 15 cm at the level of the feet);
- standing broad jump which measures explosive leg power;
- handgrip test which measures static arm strength;
- sit-ups in 30 seconds which measures trunk strength;
- bent arm hang which measures muscular endurance/ functional strength;
- 10x5-meter shuttle run which measures running speed and agility;
- 20 m endurance shuttle-run (bleep test) which measures cardiorespiratory endurance (El, Hüzmeli & Gökçek, 2020)

Anthropometric Measurements

Height and weight are the measurements used to show and compare the anthropometric properties of individuals with different characteristics. These measurements are also used to determine health status and nutritional adequacy in the development process. The weights of the students were measured with a Sinbo brand precision electronic bathroom weighing scale with a sensitivity of 0.1 kg. For weight measurements, the students were allowed to go to the scale with as few clothes as possible. Standard wall scale was used for height measurements of the students.

While taking the height measurements, the student was allowed to stand upright without shoes, two legs sticking together, knees stretched, back of the head, shoulders and heel leaning against the wall. Students stood at a 90-degree angle to the wall. The measurement was made with a small ruler from the point where the students rest their head to the wall. The data were recorded. Measurements were determined with a precision of 0.1 cm.

Table 1. Eurofit test battery applied for students with id, ds and autism.

Dimension	Factor	Description	Eurofit Test	Second Choice
1. Strength	a. Static Strength b.Explosive Strength	-Maximum Strength -Maximal Muscular Power	-Arm pull -Standing broad jump	-Hand grip -Vertical jump
2. Muscular Endurance	a. Functional Strength (dynamic strength) b. Abdominal Strength (dynamic trunk strength)	-Upper limb muscular endurance -Abdominal muscular endurance	-Bent arm hang -Sit-ups in 30 seconds	
4. Flexıbılıty	Flexibility (extent of flexibility)	Articulo-muscular range of movement	Sit and reach	
5. Speed	a. Speed of limb movement b. Running Speed	-Segmental repetitive velocity -Total body velocity	-Plate tapping time for 25 cycles -Shuttle run 10 x 5 metres	50m sprint
6. Balance	Total body balance	Coordination of total body equilibrium	Standing on one foot on a beam for 1 minute, 'flamingo' balance	

Statistical analysis

In our study, SPSS 20 package program was used for the analysis of data obtained. Normality of the distribution of values was checked by the Shapiro-wilk test. Obtained data from the students with ID, DS and Autism compared according to Shapiro-wilk, Mann-Whitney U, Wilcoxon Signed Ranks, The Kruskal-Wallis H tests. The Wilcoxon Signed Ranks Test was used to determine whether there was a significant difference between pre-test post-test results for the variables of balance, fastness, standing long jump, hand grip, sit-ups, bent arm hang, shuttle run and flexibility dependent variables. The Wilcoxon Signed Ranks Test is used to check whether the difference between two paired distributions in a group is significant (Baştürk, 2011).

The Mann-Whitney U Test was used to determine whether there was a significant difference between the posttest values of the students for the independent variables of height, weight, gender and disability level consisting of two groups. Mann-Whitney U Test is used to check whether the data collected from two unrelated groups differ significantly from each other (Büyüköztürk, 2010). The Kruskal-Wallis H Test was used to show whether there was a significant difference between the post-test values of the subject group for the disability type variable consisting of three groups. In the analysis, high rank means for balance, standing long jump, hand grip, sit-ups, bent arm hang and flexibility dependent variables and low rank means for fastness and shuttle run dependent variables were considered to be positive. For the analysis of the data, it was seen as 0.05 significance level.

RESULTS

Firstly, it was examined whether the data met the normal distribution assumptions. In this context, Shapiro-Wilk Test was performed for each dependent variable and the calculated values are given in Table 2. According to Table 2, it was concluded that the data were not normally distributed for all dependent variables ($p < 0.05$). Nonparametric tests were used to analyze the data.

Table 2. Shapiro-wilk test results of normality of distribution.

Dependent variables	Statistics	df	p
Balance	.926	41	.011
Fastness	.927	41	.012
Standing long jump	.865	41	.001
Hand grip	.945	41	.048
Sit-ups	.864	41	.001
Bent arm hang	.939	41	.030
Shuttle run	.854	41	.000
Flexibility	.899	41	.002

df: Degree of freedom, p: Significance Level determined as $p<0.05$.

Research Group

Demographic information about the students participating in the research was given in Table 3.

Table 3. Demographic data of the research group

Variables	f	%
Height		
140-160 cm.	21	51.2
161-181 cm.	20	48.8
Total	41	100
Weight		
39-55 kg.	20	48.8
More than 55 kg.	21	51.2
Total	41	100
Gender		
Male	32	78
Female	9	22
Total	41	100
Disability type		
Intellectual disability	29	70.7
Down syndrome	6	14.6
Autism	6	14.6
Total	41	100
Disability level		
Moderate	27	65.9
Severe	14	34.1
Total	41	100

The heights of 51.2% of the students participating in the research were between 140-160 cm and 48.8% were between 161-181 cm. The weights of 48.8% of the students were between 39-55 kg and 51.2% were more than 55 kg. 78% of the students were males and 22% were females. 70.7% of the students with ID, 14.6% with DS and 14.6% had autism. The level of disability of 65.9% of students were moderate while 34.1% were heavy.

The results for all students

According to flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach test results for all students, Wilcoxon Signed Ranks Test was used to determine whether there was a significant difference between the pre-test post-test values of levels of the students. The results were indicated in Table 4.

Table 4. Values of flamingo balance, tapping disc, standing long jump, hand gripping, bent arm hang, 10x5 shuttle run and sit-and-reach tests for all students.

	Flamingo Balance Test	Tapping Discs	Standing Long Jump	Hand Gripping	Sit-Up	Bent Arm Hang	10x5 Shuttle Run	Sit-and-Reach
Pretest-Posttest values(n=41)	Z= -5.374 p=.000	Z=-5.405 p=.000	Z= -5.589 p=.000	Z=-0.695 p=.487	Z= -0.210 p=.834	Z= -1.257 p=.209	Z= -5.635 p=.000	Z= -5.516 p=.000

n: Number of subjects, Z: Difference score, p: Statistical significance was determined as p <0.05.

When the data in Table 4. were analyzed respectively, a significant difference was found between the pre-test post-test values of the balance levels of students according to flamingo balance test (Z = -5.374; p <0.05). A significant difference was found between the pre-test and post-test values of fastness levels of the students according to disc tapping movement (Z = -5.405; p <0.05). A significant difference was found between the pre-test and post-test measurements regarding long jump levels of the students (Z= -5.589; p<0.05). There was no significant difference between pre-test and post-test measurements regarding hand grip strength levels of the students (Z = -0.695; p> 0.05). There was no significant difference between the pre-test and post-test measurements regarding sit-ups movement levels of the students (Z = -0.210; p> 0.05). There was no significant difference between the pre-test and post-test values regarding bent arm hang levels of the students (Z = -1.257; p> 0.05). A significant difference was found between the pre-test and post-test values regarding shuttle run levels of the students (Z = -5.635; p <0.05). A significant difference was found between the pre-test and post-test values regarding flexibility levels of the students according to sit-and-reach movement (Z = -5.516; p <0.05).

The results according to the height variable

According to the height variable The Mann-Whitney U Test was used to determine wheter there was the significant difference between post-test results of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach levels of the students and the results were indicated in Table 5.

Table 5. Values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach test levels according to the length variable of the students.

	Flamingo Balance Test	Tapping Disc	Standing Long Jump	Hand Gripping	Sit-Up	Bent Arm Hang	10x5 Shuttle Run	Sit-and-Reach
Between 140-160 CM (n=21)	Z= -1.372 p=.170	Z=-1.963 p=.050	Z=-3.810 p=.000	Z=-3.810 p=.000	Z=-1.504 p=.133	Z=-3.979 p=.000	Z=-1.722 p=.085	Z=-0.655 p=.513
Between 161-181 CM (n=20)								

n: Number of subjects, Z: Difference score, p: Statistical significance was determined as p <0.05.

When the data in Table 5. were examined respectively, no significant difference was found between posttest results of balance levels of students according to height variable (Z = -1.372; p> 0.05). No significant difference was found between the post-test values of fastness levels of students (Z = -1.963; p> 0.05). A significant difference was found between the post-test values of the standing long jump levels of students (Z = -3.810; p <0.05). A significant difference was found between the post-test results of the hand strength levels of the students (Z = -3.810; p <0.05). No significant difference was found between the post-test values of sit-ups movement levels of the students (Z = -1.504; p> 0.05).

A significant difference was found between the post-test values of bent arm hang levels of the students (Z = -3.979; p <0.05). No significant difference was found between the post-test values of shuttle run levels of students (Z = -1.722; p> 0.05). No significant difference was found between the post-test values of flexibility levels of students (Z = -0.655; p> 0.05).

The results according to the weight variable

According to the weight variable, The Mann-Whitney U Test was used to determine whether there was a significant difference between the post-test values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach levels of the students. The findings were as indicated in Table 6.

Table 6. Values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach test levels according to the weight variable of the students.

	Flamingo Balance Test	Tapping Disc	Standing Long Jump	Hand Gripping	Sit-Up	Bent Arm Hang	10x5 Shuttle Run	Sit-and-Reach
39-55 kg. (n=20)	Z= -1.176 p=.240	Z=-1.191 p=.234	Z=-0.431 p=.667	Z=-2.226 p=.026	Z=-0.706 p=.480	Z=-1.171 p=.242	Z=-1.380 p=.168	Z=-0.423 p=.672
55+ kg. (n=21)								

n: Number of subjects, Z: Difference score, p: Statistical significance was determined as p <0.05.

When the data in Table 6. were examined respectively, no significant difference was found between the post-test values of balance levels of the students according to the weight variable (Z = -1.176; p> 0.05). No significant difference was found between the post-test values of fastness levels of the students (Z = -1.191; p> 0.05). No significant difference was found between the post-test values of standing long jump levels of the students (Z = -0.431; p> 0.05). A Significant difference was found between the post-test values of hand strength levels of students (Z = -2.226; p <0.05). No significant difference was found between the post-test values of sit-ups levels of the students (Z = -0.706; p> 0.05). No significant difference was found between the post-test values of shuttle run levels of the students (Z = -1.380; p> 0.05). No significant difference was found between the post-test values of flexibility levels of the students (Z = -0.423; p> 0.05).

The results according to the gender variable

According to the gender variable, The Mann-Whitney U Test was used to determine whether there was a significant difference between the post-test values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach levels of the students. The findings were as indicated in Table 7.

Table 7. Values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach test levels according to the gender variable of the students.

	Flamingo Balance Test	Tapping Disc	Standing Long Jump	Hand Gripping	Sit-Up	Bent Arm Hang	10x5 Shuttle Run	Sit-and-Reach
Female (n=9)	Z= -0.426 p=.670	Z=-0.332 p=.740	Z=-3.041 p=.002	Z=-3.542 p=.000	Z=-0.995 p=.320	Z=-2.748 p=.006	Z=-0.317 p=.751	Z=-0.692 p=.525
Male (n=32)								

n: Number of subjects, Z: Difference score, p: Statistical significance was determined as p <0.05.

When the data in Table 7. were examined respectively, no significant difference was found between the post-test values of balance levels the students (Z = -0.426; p> 0.05). No significant difference was found between the post-test values of fastness levels of the students (Z = -0.332; p> 0.05).

A significant difference was found between the posttest values of standing long jump levels of the students (Z = -3.041; p <0.05). A significant difference was found between the post-test values of hand grip of the students (Z = -3.542; p <0.05). No significant difference was found the post-test values of sit-ups levels of the students (Z = -0.995; p> 0.05). A significant difference was found the post-test values of bent arm hang levels of the students (Z = -2.748; p <0.05). No significant difference was found between the post-test values of shuttle run levels of the students (Z = -0.317; p> 0.05). No significant difference was found the post-test values of flexibility levels of students (Z = -0.692; p> 0.05).

The results according to the disability type

According to the disability type variable, Kruskal-Wallis H Test was used to determine whether there was a significant difference between the post-test values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach levels of the students. The findings were as indicated in Table 8.

Table 8. Values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach test levels according to the disability type variable of the students.

	Flamingo Balance Test	Tapping Disc	Standing Long Jump	Hand Gripping	Sit-Up	Bent Arm Hang	10x5 Shuttle Run	Sit-and-Reach
Intellectual disability (n=29)	X2= 3.615	X2= 3.233	X2= 1.233	X2= 8.062	X2= 7.913	X2= 1.475	X2= 11.533	X2= 11.533
Down Syndrome(n=6)	p=.164	p=.199	p=.483	p=.018	p=.019	p=.478	p=.003	p=.003
Autism (n=6)								

n: Number of subjects, df: degree of freedom, p: Statistical significance was determined as p <0.05.

When the data in Table 8. were examined respectively, no significant difference was found between the post-test values of balance levels of the students according to the disability type variable (Chi-Square = 3.615; p> 0.05) No significant difference was found between the post-test values of levels of fastness of the students (Chi-Square = 3.233; p> 0.05). No significant difference was found between the post-test values of standing long jump levels of the students (Chi-Square = 1.233; p> 0.05). A significant difference was found between the post-test values of hand gripping levels of the students (Chi-Square = 8.062; p <0.05). “Mann-Whitney U Test” was used in order to determine which groups had significant difference. Thus, a significant difference was found between the students with and autism and the students with DS in favor of the the students with ID and autism. It was found that the hand grip level values of the students with ID and autism were higher than the students with DS.

A significant difference was found between the post-test values of sit-ups levels of the students (Chi-Square = 7.913; p <0.05). “Mann-Whitney U Test” was used in order to determine which groups had significant difference. Thus, a significant difference was found between the students with ID and DS and the students with autism in favor of the students with ID and DS. It was found that the values of sit-ups levels of the students with ID and DS were higher than the students with autism. No significant difference was found between the post-test values of bent arm hang levels of the students (Chi-Square = 1.475; p> 0.05) According to this, although the disability type was not an effective factor in terms of bent arm hang levels of the students, it could be said that although there was no statistically significant difference, it was observed that students with ID and autism had higher bent arm hang levels than the students with DS. A significant difference was found between the post-test values of shuttle run levels of the students (Chi-Square = 11.533; p <0.05). “Mann-Whitney U Test” was used in order to determine which groups had significant difference. Thus, a significant difference was found between the students with ID and DS and the students with autism in favor of the students with ID and DS.

It was found that the values of shuttle run levels of the students with ID and DS were more positive than the students with autism. A significant difference was found between the post-test values of flexibility levels of the students (Chi-square = 11.533; p <0.05). "Mann-Whitney U Test" was used in order to determine which groups had significant difference. Thus, a significant difference was found between the students with DS and the students with ID and autism in favor of the students with DS. It was found that the flexibility level values of the students with DS were higher than the students with ID and autism.

The results according to the disability type

According to the disability level variable, The Mann-Whitney U Test was used to determine whether there was a significant difference between the post-test values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach levels of the students. The findings were indicated in Table 9.

Table 9. Values of flamingo balance, tapping disc, standing long jump, hand grip, bent arm hang, 10x5 shuttle run and sit-and-reach test levels according to the disability level variable of the students.

	Flamingo Balance Test	Tapping Disc	Standing Long Jump	Hand Gripping	Sit-Up	Bent Arm Hang	10x5 Shuttle Run	Sit-and-Reach
Moderate (n=27)	Z= -1.446 p=.148	Z=-2.593 p=.010	Z=-1.210 p=.226	Z=-0.856 p=.392	Z=-3.184 p=.001	Z=-1.333 p=.183	Z=-4.128 p=.000	Z=-1.956 p=.051
Severe (n=14)								

n: Number of subjects, Z: Difference score, p: Statistical significance was determined as p <0.05.

When the data in Table 9. were examined respectively, no significant difference was found between the post-test values of balance levels of the students according to the disability level variable (Z = -1.446; p> 0.05). A significant difference was found between the post-test values of fastness levels of the students reciprocally (Z = -2.593; p <0.05). No significant difference was found between the post-test values of standing long jump levels of the students reciprocally (Z = -1.210; p> 0.05). No significant difference was found between the post-test values of hand grip levels of the students reciprocally (Z = -0.856; p> 0.05). A significant difference was found between the post-test values of sit-ups levels of the students reciprocally (Z = -3.184; p <0.05). No significant difference was found between the post-test values of bent arm hang of the students reciprocally (Z = -1.333; p> 0.05). A significant difference was found between the post-test values of shuttle run levels of the students reciprocally(Z = -4.128; p <0.05). No significant difference was found between the post-test values of flexibility levels of the students reciprocally (Z = -1.956; p> 0.05).

DISCUSSION

The aim of this study was to compare the acqusition sufficiency of goals of physical education lessons to which male and female students with moderate and severe ID, DS and Autism between 11-17 years of age attended with Eurofit test battery. The results obtained from our applications were compared. Our study was successfully applied to a total of 41 students consisting of 32 male and 9 female students attending to the physical education classes in Recep Birsin Özen Special Education Center in Erzurum. In the anthropometric tests applied to the students participating in our research, 51.2% of the students were between 140-160 cm in length and 48.8% of them were between 161-181 cm. The weight of 48.8% of the students was between 39-55 kg and 51.2% of them were more than 55 kg. 78% of the students were males and 22% were females. 70.7% of the students had ID, 14.6% with DS and 14.6% had autism. The disability level of 65.9% of the students was moderate and 34.1% was heavy. Significant differences were found between pre-test and post-test values of flamingo balance, tapping discs, standing long jump, shuttle run and sit-and-reach levels. Although there was an increase in bent arm hang, sit-ups and hand grip results, no statistically significant difference was found. According to these results, it was thought that the goals chosen depending on the physical education program mostly had a positive effect on the motor development of children with ID, DS and

Autism. Flamingo balance test, arm movement speed, grip strength, trunk strength and flare length values of the children were found significant. In this study according to the gender variables a significant difference was found the post-test values of standing long jump, hand grip, bent arm hang levels of the students. No significant difference was found between the post-test values of balance, plate tapping, sit-ups, shuttle run and sit and reach levels the students. When it was compared with the study by Kaya et al.(2018), hand grip strength levels was similar and plate tapping and sit-ups, flamingo balance post-test levels weren't parallel with our study. Since post-tests levels of standing long jump and flexibility in the study have no difference, the results weren't support our study.

In our study according to the weight variable no significant difference was found between the post-test values of balance, fastness, standing long jump, sit-ups, shuttle run and sit and reach levels of the students and a significant difference was found between the post-test values of hand grip strength levels of students. In the study by Salaun and Berthouze-Aranda (2012) significant differences between non-obese and obese boys were found for standing long jump test, sit-and-reach test, sit-up test and the shuttle run test; and between normal and obese girls for plate tapping, sit-ups and the shuttle run test. For both boys and girls, the differences between obesity groups were not significant for sit and reach levels. These results weren't parallel with our study. Overweight boys demonstrated better performance than obese boys in sit-up, in sit-and-reach test and for the standing broad jump test. According to these results, the study supported our study.

In the study on children with DS by El et al. (2020), a negative relationship was found between fat weight and sit and reach performance. The children who had high-fat weight were found to be less successful in the sit and reach than children with low-fat weight. In our study, although there was no significant difference between sit and reach levels according to the weight variable, the results was similar to the study. In another study by Demirel and Şirinkan (2018), according to pretest and posttest results of the study; significant diferences were found between pre-test and post-test results of flamingo balance test, sit and reach flexibility test, standing long jump test, right handgrip test, sit-ups in 30 seconds test, bent arm hang in 30 seconds test, vertical jump test of eurofit tests. However, no significant data were found between pre-test and post-test results of tapping discs test, 10x5 meter shuttle run and lefthand grip test. According to the these results, this study data supported our study.

According to the results of a study by Demirel et al. (2016); generally, while observing improvment in the tests regarding the major muscle groups(leg), in the tests regarding the minör muscle groups(hand), no meaningful development results were achieved. In the results of our study, no statistically significant difference was found regarding hand gripping test. So the results was similar. At the results of the study by Sirinkan (2011), the levels of flamingo balance test, plate tapping test, sit and reach, standing long jump, handgrip test, sit-ups test,bant arm hang, 10x5 meters suttle run test were significant improved. Although there wasn't a significiant diffirance only in bent arm hang, sit-ups and hand grip test results, according to the other results of the study our study was parallel. It was reported that sport is vital for handicapped rehabilitation in gaining balance, muscle control, freedom in movements, and coordination (Yüksel, 2018). The data obtained were in parallel with the study data of Biçer et al. (2004). As a result of a 3-month exercise program applied for the individuals with ID, the development of jump, leap, hand grip, push-ups, reverse and straight sit-ups, sit-and-stand movements levels supports our study.

In a study planned by Yanardag et al. (2009) to determine the effects of different adapted exercise programs on the physical fitness levels of individuals with autism, they found that adaptive exercise programs implemented in water and on land for autistic children improved physical fitness and thus they supported our results. In another study, Kubilay et al. (2011) performed balance and posture exercises with exercise ball three times a week and during 8 weeks. They observed an improvement in balance levels of students. Thus, they support the conclusion that improving the balance levels of the students in our study. In addition, Kubilay et al. found that this balance program produced an increase in the level of sit-ups movement. This result showed that the goals we applied for balance contributed to the development of force. No significant difference was found between post-test values regarding shuttle run, balance and

sit-ups movement levels in the comparisons made However, it was concluded that the students who were taller had higher values for shuttle run,

In terms of height variable, although there was no significant difference between the pre-test and post-test values of the data obtained from tapping discs test, it was seen that taller students had relatively better results. As a result of the tests, it was determined that the post-test values of standing long jump, hand grip and bent arm hang levels were significantly higher in the taller students. No significant difference was found in the results of flexibility levels of the students according to height variable. However, the shorter students had higher flexibility levels than the taller students.

No significant difference was found between the post-test values of flamingo balance, tapping discs, standing long jump, sit-ups, bent arm hang, shuttle run and sit-and-reach levels of the students with ID according to the weight variable. However, although no statistically significant difference was found between the post-test values of flamingo balance, tapping discs, standing long jump, sit-ups and shuttle run levels, it was observed that these parameter values were relatively higher for the students with low weight than the students with high weight. In addition, although no statistically significant difference was found between the post-test values of the bent arm hang and the flexibility levels of the students with ID, it was observed that these parametric values were relatively higher for the students with high weight than the students with low weight. A significant difference was found between the post-test values of the hand grip levels of the students according to the weight variable. As a result, it was concluded that the hand grip levels of the overweight students with ID were higher.

When the gender variable of the students with ID in the research group was examined, no equal distribution was observed. Although no significant difference was found between the post-test values of flamingo balance, tapping discs, sit-ups, shuttle run and flexibility levels of the students, the values regarding flamingo balance, touching discs, shuttle movement and shuttle running levels were higher in favor of male students; the values regarding flexibility levels were higher in favor of female students. When the gender variable was examined, a

according to the height of the students. balance and sit-ups movement values than the relatively the shorter students.

significant difference was found between the post-test values of standing long jump, hand grip and bent arm hang levels of the students with ID. It was concluded that this difference was positive for male students.

When the results were examined according to the disability types of the students, the variables were ID, autism and DS. No significant difference was found between the post-test values of flamingo balance, tapping discs, standing long jump, bent arm hang levels of the students. However, it was concluded that the values related to the level of balance differed positively in favor of the students with ID and DS. According to the post-test results of tapping discs test, it was concluded that the levels of the students with ID and autism were higher than the students with DS. Although no significant difference was found between standing long jump values, post-test scores were found higher in favor of the students with ID and autism. In addition, although no significant difference was found between the post-test values of bent arm hang, it was concluded that the results were higher in favor of the students with ID and autism.

Significant differences were found between the post-test values of hand grip, sit-ups, shuttle run and sit-and-reach levels according to the type of disability. The post-test values of hand grip levels were found higher in favor of the students with ID and autism. The post-test values of sit-ups level made a positive difference for the students with ID and DS. A positive difference was found between the post-test values of shuttle run levels in favor of the students with ID and DS. A significant difference was found between the post-test values of sit-and-reach levels in favor of the students with DS.

In another study, Connoly et al. (1986) who performed the Bruininks Oseretsky motor competence test found that the running speed, balance, strength and visual motor control levels of the individuals without DS were positively different from the levels of the individuals with DS relatively. In this study conducted by Connoly et al. (1986), it was found that the values of gross motor and fine motor skill levels of children without DS were significantly higher than the values of children with DS.

In this study comparison regarding gender variable, Connoly et al. (1986) found no significant difference between the test results of males and females with DS and in the same way, they found no significant difference between the test results of males and females without DS. Consequently, Connoly et al. (1986) argued that there were significant differences between gross and fine motor skills of the children with and without DS and this study supports the results of our study.

In another study, Arslan et al. (2015) observed the gross motor development as a result of a 12-week program on 14 boys with atypical autism and a mean age of 10 years. As a result, they found a significant increase between the pre-test and post-test values of running speed, balance and long jump levels. This result is in parallel with the similar parameters of our study. When the results of the disabillity level variable were examined, although no significant difference was found between the post-test values of flamingo balance, standing long jump, hand grip, bent arm hang and sit-and-reach levels of the students with moderate and severe ID, it was concluded that the students with moderate ID had higher values of this parameter than the students with severe ID and this was an expected result. A significant difference was found between the post-test values of tapping discs, sit-ups and shuttle run levels of the students and this difference was in favor of the students with moderate disabilities. It was thought to be an expected result of the test applied to the sample of our study.

In a study to investigate the effects of exercise on the physical fitness levels of the individuals with ID with Eurofit tests, Golubovic et al. (2012) stated that the type of exercise made a difference rather than the type of disability in the test results. In this study, it was found that the children with borderline ID improved better performance at balance, cardiorespiratory endurance, and bent arm hang and the children with mild ID improved better performance at standing long jump and abdominal muscle endurance. In this study, Golubovic et al. (2012) found the children with mild ID had better values in the long jump test, which requires speed, good coordination and explosive movement, which was not characteristic for these individuals but they stated that this would not be generalized. However, they said that these abilities were highly improvable for children with ID. As a result, it was determined that the results obtained from the tests we conducted at the end of our physical education program goals were parallel to these results.

In a study conducted by Giagazoglou et al. (2013) to investigate the effects of trampolin exercise on balance and motor performance of children with ID, significant performance improvements were observed according to the post-test results of a 12-week study with different trampolin exercises. They explained that this balance development occurred as a result of the adaptation of the motor sensors of the participants to the unstable trampoline surface and the effort to maintain the balance. Giagazoglou et al. (2013) stated that as a result of their study, a well-planned exercise program would contribute to the development of skill that could make motor performance and balance successful.

The general motor performance of persons with various levels of mental disability and various age and gender plays an important role in their social life. A lower performance level impairs the co-existence with their environment and cooperation with others, thus their social health. A higher level is a chance for a longer independent life. It makes sense for these people to take care of their performance. At present, attention is focused not only on the life span, but also on its quality(Bartík & Bolach, 2015)

Conclusion

According to these results, in the physical education and sports classes, it was seen that the goals chosen according to the students' level improved the physical capacities of the students in general. According to these results, it was seen that the individual goals chosen for the students in special education schools affiliated to the Republic of Turkey Ministry of National Education contributed to the development of balance, fastness, leg strength, upper body movement speed and flexibility of the students and did not only contribute to the development of hand strength, arm strength and abdominal muscle of the students. The results of our study and the results of previous studies are parallel. Hand and arm strengths of individuals with special needs are important in order to perform their daily life skills (dressing, eating and drinking, self-care) efficiently.

Therefore, in order to use the hands or arms in a coordinated manner and to perform daily tasks comfortably, the selection of appropriate goals is important for the children with special needs to make their self-care skills and daily life skills comfortable and independent. To achieve the target in the shortest time and in the most efficient way, support materials (appropriate size for the student hand strength tools, rubber ball, plates band, medicine ball) can be used. Students with special needs who have physical disabilities or who have priority in physical development can be included in special studies except physical education and sports lessons and academic studies. Physical education and sports class hours can be increased to contribute to the development of individuals with special needs.

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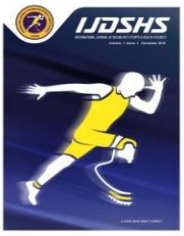

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RESEARCH ARTICLE

The Relationship Between Caregiver Workload and Stress Levels with Clinical Symptom Severity in Cerebral Palsy

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Abstract

The aim of this study is to compare the functional status, spasticity, motor function status of children with cerebral palsy and their caregivers' workload and stress levels. A single-center prospective cross-sectional study was carried out with 30 children with Cerebral Palsy (CP) and their 30 caregivers. The clinical status of the children was assessed with the Modified Ashworth Scale (MAS), Gross Motor Function Classification System (GMFCS), The Functional Independence Measure for Children (WeeFIM). The caregivers' workload and stress levels were evaluated with Bakas Caregiving Outcomes Scale (BCOS) and Perceived Stress Scale (PSS), respectively. The mean age of the children was 11.46±7.45 years. In correlation analysis, the caregivers' BCOS score was related to the children's MAS score ($p<0.05$). On the other hand, there was a significant relationship between BCOS and PSS scores of the caregivers ($p<0.05$). Greater levels of spasticity in the children were associated with greater levels of workload. Stress level is higher in caregivers with a high workload.

Keywords
Cerebral Palsy, Caregiver; Workload; Stress, Clinical Stiuation

INTRODUCTION

Cerebral palsy (CP) is defined as a group of motor syndromes that occur as a result of immature non-progressive pathologies in the brain and are mostly accompanied by different neurodevelopmental disorders (Krigger, 2006; P. Rosenbaum et al., 2007; Sankar & Mundkur, 2005). CP is the most common neuromotor disorder and the main cause of functional impairment in childhood (Fernández-Alcántara et al., 2015). The prevalence of CP in children between 2-16 years of age is higher in Turkey from developed countries and was reported to be 0.44% (Serdaroglu, Cansu, Md, & Tezcan, 2006). The clinical situation and the severity of various symptoms in children vary over time. For instance, initial hypotonia may be replaced by spasticity or involuntary movements later on. Movement and posture disorders in children with cerebral palsy constitute the basic clinical picture, but mental retardation, seizures, eye problems (such as homonymous hemianopia, strabismus), stereognosis, proprioception disorders, and hearing disorders may accompany the clinical picture. In this case, the rehabilitation process is more difficult and it is difficult to gain physical independence (Serdaroglu et al., 2006).

CP is a chronic and complex condition that requires high maintenance costs and causes serious impairments in the general motor skills of the children. Spastic paralysis causes various problems such as mental retardation, mental impairment, speech impairment, vision-hearing impairment,

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and limitations in self-care functions such as feeding, dressing, bathing, and ambulation. All of these have negative effects on children's daily life activities and parents' family dynamics. Mothers of children with CP have important roles in the treatment and management of CP (El, Peker, Bozan, Berk, & Koşay, 2007). In particular, functional disorders cause essential problems. The functional state is "the ability of a person to participate in society without physical and mental restrictions".

Caring is a natural role of mothers; however, caring for a child with functional limitations and long-term addiction is completely different and affects the physical and emotional functions of mothers (Garip et al., 2017). Families play an important role in providing care to children with CP. Caregivers often become isolated from pre-existing relationships and social activities because of their responsibilities and roles. Especially the physical and psychological complications of the disease and intensive treatment sessions severely burden caregivers' life. One of the most important factors that increase caregiving work is the deterioration of the child's physical abilities. It was observed that the functional capacity decreased in the advanced stages of the disease when the motor symptoms of the disease were exacerbated, and it was also shown that caregiver responsibilities and workload increased during this period (Stetz & Brown, 1997).

Chronic emotional stress in families; increases their anxiety and stress levels, as well as causes overcoming the workload more difficult. Feelings of social isolation and loneliness can be experienced. This situation decreases life satisfaction and quality of life (Deniz, Dilmaç, & Arıcak, 2009). In this study, the level of the child's clinical condition will be correlated with the caregiver's workload and anxiety. In this way, it will be revealed whether the workload and anxiety situations of the caregiver are related to the clinical situation. The aim of this study is to compare the functional status, spasticity, motor function status of children with cerebral palsy and their caregivers' workload and stress levels.

MATERIALS AND METHODS

Study Design and Participants

A single-center prospective cross-sectional study was carried out with 30 children with CP and their 30 caregivers in "X" Special Education and Rehabilitation Center. The inclusion criteria were; (1) children with CP, (2) aged <18 years. The exclusion criteria of the study were; (1) cognitive problems of the mother who unable to fill the questionnaire, (2) mothers' caregiving to another chronic patient, (3) a history of chronic disease in mothers, (4) mothers caring for a child <2 years, (5) mothers who are pregnant, (6) caregivers who do not give consent to participate in the study. The study protocol was approved by the ethics committee of Ege University (No: 20-10.1T/22). All of the assessments were conducted in accordance with the Helsinki declaration. All cases provided a written informed consent approved by the ethics committee.

Data Collection

The children and their caregivers were evaluated on the same day of inclusion. All muscle strength measurements and other performance tests were conducted by the same researcher (physiotherapist). Demographic, physical, and pathological information of the children with CP were recorded. Also, the demographical characteristics of the caregivers were obtained in a face-to-face interview. Children and their caregivers were assessed using the outcome measurements listed below.

Modified Ashworth Scale (MAS)

MAS was used to evaluate muscle tone of the children. In the evaluation, scores between 0-4 are given according to the increase in the amount of resistance felt during passive movement of the arm and leg (0 = normal muscle tone, 1 = slight increase in tonus felt at the end of the joint range of motion (ROM), 1 + = slight tone felt in less than half of the ROM. 2 = significant increase in a tone that does not prevent passive movement but is felt in most of ROM, 3 = significant increase in a tone that makes passive movement difficult during ROM, 4 = severe increase in tone, affected movement which is in a rigid state (Charalambous, 2014; Mutlu, Livanelioglu, & Gunel, 2008).

Gross Motor Function Classification System (GMFCS)

GMFCS was used to classify the severity of the impairment in children's gross motor functions. It is a valid and reliable standardized system that classifies the gross motor functions of children with CP between the ages of 0-12 in five levels. Children with cerebral palsy are the least dependent on level 1 and the most dependent on

level 5 in motor functions (Palisano, Rosenbaum, Bartlett, & Livingston, 2008; P. L. Rosenbaum, Palisano, Bartlett, Galuppi, & Russell, 2008).

The Functional Independence Measure for Children (WeeFIM)

Turkish version of the WeeFIM was used for the functional status assessment of children with cerebral palsy. WeeFIM is adapted from the Functional Independence Measure (FIM) for adults and can be applied by direct observation, interview, or a combination of both. It consists of six sub-parameters and 18 questions. Sub-parameters: self-care (6 items), sphincter control (2 items), transfer (3 items), locomotion (3 items), communication (2 items), and social status (3 items). Scoring is done between 1 (fully dependent) and 7 (fully independent) points. The lowest possible score is 18 and the highest score is 126 (Msall et al., 1994; Tur et al., 2009).

Bakas Caregiving Outcomes Scale (BCOS)

Turkish version of BCOS was used for the workload assessment of caregivers. The scale shows both positive and negative effects. The scale consists of 15 questions scored from +3 (the best direction) to -3 (the worst direction). It is a Likert type scale ranging from 1 to 7. A minimum of 15 and a maximum of 105 points can be obtained on the scale. As the score increases, it is interpreted as "change in the good direction" and as the score decreases it is interpreted as "change in the bad direction" (Bakas & Champion, 1999; Kavlak et al., 2018).

Perceived Stress Scale (PSS)

Consisting of 10 items, the PSS is designed to measure how stressful certain situations are perceived in a person's life. Participants evaluate each item on a 5-point Likert-type scale ranging from "Never (0)" to "Very often (4)". Items containing positive statements are scored in reverse. PSS is scored between 0 and 40. High score indicates that the person has an excessive perception of stress. The Turkish version of PSS was used in our study (Eskin, Harlak, Demirkıran, & Dereboy; Lee, 2012).

Statistical Analysis

The statistical package for the social sciences for Windows version 25 (SPSS Inc, Chicago, IL) computer program was used for data analysis. Quantitative variables were presented as mean ± standard deviation (X ± SD), range (minimum-maximum), and qualitative variables percent (%). Results were considered statistically significant when p-value <0.05. The Shapiro-Wilk tests were used to determine the normal distribution. The "Spearman rank correlation coefficient" was used to investigate the relationship between caregiver workload and stress levels of the caregivers with clinical symptom severity. The Pearson correlation coefficients were interpreted as; 0-0.19= very low, 0.20-0.39= low, 0.40-0.69= medium, 0.70-0.89= high, 0.90-1.0= very high (Streiner, Norman, & Cairney, 2015).

RESULTS

The mean age of the children was 11.46±7.45 years. More than half of children was male (%80). Body Mass Index of the children was 19.95±5.49 kg/m^2 (classified as normal). Less than half of the children use assistive devices or orthoses (43.3%). The mean values of the children's physical and pathological status were presented in Table 1. 90% of the caregivers were urban residents.

Table 1: Physical and pathological characteristics of the children

	Total (n=30)
Age (years, mean±SD)	11.46±7.45
Height (m, mean±SD)	1.33±0.32
Weight (kg, mean±SD)	40.31±23.91
BMI (kg/m2, mean±SD)	19.95±5.49
Assistive Device	
Yes (n, %)	13 (43.3)
No (n, %)	17 (56.7)
Modified Ashworth (mean±SD)	2.80±1.51
GMFCS (mean±SD)	3.06±1.08
WeeFIM (mean±SD)	68.7±34.2

SD: standard deviation, n: number of patients, %: percentage, GMFCS: Gross Motor Function Classification System, WeeFIM: The Functional Independence Measure for Children

The socio-demographic characteristics of the caregivers and the absolute values of stress and workload scores are given in Table 2. In correlation analysis, the BCOS score of the caregivers was related with MAS score of the children ($p<0.05$) (Table 3). On the other hand, there were significant relationship between BCOS and PSS scores of the caregivers ($p<0.05$). Also, GMFC and WeeFIM scores of the children were strongly correlated ($p<0.001$).

Table 2: Absolute values (standard deviation, min-max) for the caregivers

n:30	Mean±SD
Marital status (n, %)	
Married	29 (96.7)
Single	1 (3.3)
Residence (n, %)	
Urban	27 (90)
Rural	3 (10)
Education (n, %)	
Literate	11 (39,9)
Primary school	10 (33.3)
High school	5 (16.6)
University or postgraduate	4 (13.3)
Caregiving duration (mean±SD)	10.56±7.23
PSS (mean±SD)	17.20±4.58
BCOS (mean±SD)	51.56±10.98

SD: standard deviation, n: number of patients, %: percentage, PSS: Perceived Stress Scale, BCOS: Bakas Caregiving Outcomes Scale

Table 3: Correlation between Modified Ashworth, GMFCS, WeeFIM with PSS and BCOS

n:30	PSS	BCOS
Modified Ashworth	0.80	-0.37*
GMFCS	-0.29	0.14
WeeFIM	0.05	0.11

*: $p<0.05$, **: $p<0.01$, PSS: Perceived Stress Scale, BCOS: Bakas Caregiving Outcomes Scale, GMFCS: Gross Motor Function Classification System, WeeFIM: The Functional Independence Measure for Children

DISCUSSION

The present study aimed to demonstrate the relationship between the functional status, spasticity, motor function status of children with cerebral palsy and their caregivers' workload and stress levels. According to the results of the study we concluded that, greater levels of spasticity in the children were associated with greater levels of workload. In addition, the workload of caregivers was associated with stress levels. Stress level was found to be higher in the caregivers with high workload. However, there was no relationship between stress level of the caregivers and clinical parameters of the children.

Spasticity is one of the primary factors affecting the functional level and independence of children with cerebral palsy (Liao, Jeny, Lai, Cheng, & Hu, 1997; Ross & Engsberg, 2007). The increase in spasticity causes children to be unable to perform daily living activities independently (Park, 2018; Shamsoddini, Amirsalari, Hollisaz, Rahimnia, & Khatibi-Aghda, 2014). In this case, the caregivers' workload will increase and they will make more effort for the child to perform daily life activities (Siritaratiwat, Inthachom, & Warnset, 2012). We used MAS, one of the most common and essential assessment tools used in evaluating spasticity, and determined the children's spasticity levels (Li, Wu, & Li, 2014). On the other hand, BCOS was one of the most practical tools used to assess caregivers' workload (Bakas, Champion, Perkins, Farran, & Williams, 2006). As expected, the workload and level of spasticity were correlated. However, there was no relationship between other clinical parameters and BCOS. This situation may be due to our relatively small sample size. Our study was carried out with a pragmatic approach, using the conditions and facilities available. Among the clinical parameters, it can be claimed that spasticity is the parameter that provokes the most workload. However, more fundamental analysis can be obtained with a larger number of samples and a model to be created using multifactorial variables in regression analysis. Our study may be an essential initial finding to consider spasticity as an indicator of workload in future studies.

A recent study by Eminel et al. concluded that caregivers of children with walking disabilities had higher workloads (Eminel, Kahraman, & Genc, 2020). They also stated that

these caregivers have more physical and psychological problems. The results obtained from the study are consistent with our research. Similarly, another recent study examined stress levels in families and caregivers of children with cerebral palsy (Fritz & Sewell-Roberts, 2020). It has been demonstrated that the children's clinical condition is not consequently linked to the stress level of the family. Since this study is qualitative research, it was stated that other factors that may cause stress levels may also be significant at the family's psychological level. It has been described that the social, behavioral, and physiological characteristics of the child and the financial and socioeconomic level of the family can be determining factors in terms of stress level.

In another study, different results were obtained in terms of different psychological parameters between mothers' anxiety levels and the clinical condition of individuals with cerebral palsy (Akmeşe, Mutlu, & Günel, 2007). In our study, the caregiver's stress level was not found to be related to the child's clinical condition. All of the caregivers were the families of the children. We recorded the socio-demographic status of the families. However, all of these parameters were categorical variables. It could not be examined in detail whether there is a difference in terms of stress and workload among individuals with different education levels and economic income. For this reason, the relatively small sample size is the most significant limitation of our study. Besides, the stress level could be evaluated by including different sub-parameters. In this way, it can be seen in what sub-dimensions of stress there is an increase in children's caregivers. Last but not least, forming the sample homogeneously from individuals with different cultural segments and economic income levels can yield more precise results.

Conclusion

Greater levels of spasticity in the children were associated with greater levels of workload. Besides, the workload of caregivers was associated with stress levels. Stress level is higher in the caregivers with high workload.

Ethical approval

The study was carried out in accordance with the ethical principles and the Helsinki Declaration. Informed consent of the patients was obtained. The study protocol was approved by the ethics committee of Ege University (No:20-10.1T/22)

Declaration of Interest Statement

The authors report no conflicts of interest and certify that no funding has been received for this study and/or preparation of this manuscript.

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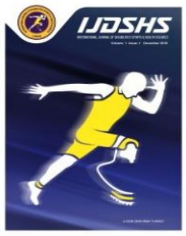

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RESEARCH ARTICLE

Segmental Musculoskeletal Examinations of Injured Adolescent Ballet Dancers Mimic a Decreased Strength, Anaerobic Power and Endurance Performance

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Abstract

The primary purpose of this research was to gather information on whether overload placed upon lower extremity muscles during aerobic dance-only classes induce negative adaptations on muscular strength, endurance and, anaerobic capacity due to the inadequate strength and conditioning programs. The second purpose was to determine whether pre-season screenings of injured dancers showed drastic changes in isokinetic mean work, power, and moments before injury occurrence to identify predisposing factors compared to healthy counterparts. Ten healthy and 11 injured adolescent female ballet dancers who experienced anterior cruciate ligament injury during ballet performance participated in this study. Anthropometric measurements, anaerobic power, muscle strength and endurance performance scores were recorded using preliminary testing sessions. Significant correlations were occurred between fatigue parameters of extensor muscles and the decline in knee extension mean work, power, and moment (r=.831, p<.001; r=.961, p<.001; r=.969, p<.001). Fatigue index of flexor muscles was also positively correlated with the decline in mean work, power, and moment parameters of knee flexor muscles at 1-5 to last 5 reps (r=.818, p<.001; r=.837, p<.001; r=.931, p<.001), respectively. As a result, segmental musculoskeletal examinations on anaerobic power, muscle strength and endurance performance revealed that dancers performing aerobic dance only classes are prone to suffer lower extremity injuries and muscular characteristics of ankle, knee and hip muscles also predispose a decreased strength, anaerobic power and endurance performance following an anterior cruciate ligament injury.

Keywords
Ballet, Strength, Anaerobic Power, Endurance, Range of Motion

INTRODUCTION

Ballet is a performing art form that requires enhanced muscle strength, aerobic and anaerobic capacity performing physically demanding and purposefully selected sequences of human movements. Especially in the classical ballet, which is formed with the execution of a sequence of steps, dancers are not only expected to show their performance skills coordinated with music but also must the techniques be shown with grace, poise, and understanding the nature of ballet (Guidetti et al., 2007). Due to the demand for specific movements during ballet performance, dancers demonstrate a greater range of motion and strength at the hip joint compared to the counterparts from other sports disciplines while they have weaker upper body, torso, hamstrings, and quadriceps strength (Teitz, 2000). Despite this fact, elected parts of the body are subjected to loads greater than those to which they are accustomed to performing purposefully selected sequences of movements. In this regard, an overload, a possible strength discrepancy, or a bilateral strength asymmetry in the lower extremity muscles may lead to serious injuries due to the improper alignment of the body during some specific ballet movements.

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One of the most common misconceptions in ballet curriculum is that aerobic dance classes are thought to be sufficient to meet all physical and physiological demands of dancers even during the recovery period following an injury despite the fact that orthopedic rehabilitation can no longer do without strength and endurance training either (Stracciolini et al., 2016). However, the traditional ballet curriculum does not contain additional strength training programs in order to avoid undesirable hypertrophy due to the aesthetic demands of ballet (Twitchett et al., 2009). This common misconception is not surprising considering the assumptions about dance conditioning which are thought to be "myths" and have no basis, in fact.

Monitoring the muscular strength status of dancers can aid to minimize the risk of injury and enables the teachers to detect any progression towards negative health outcomes associated with poor performance since the insufficient amount of strength exercise in ballet curriculum may also increase the potential risk of injuries resulted from strength deficiency (Koutedakis et al., 2007). Most of the specific ballet movements, as well as turnout, more readily achieved in the young dancers depends on the soft tissue allowance at the hip joint and this excessive load may also cause serious injuries and significant damage to these joints due to inadequate strength level at this ages. Additionally, most teachers encourage the students to turn out only from the hip angles due to the form of the movement. However, a study suggests that on average, 60% of turnout was created by the outward rotation of the hip, and 30% from the ankle, and the remaining percentage created by the tibia and knee joint (Grossman et al., 2005). The multiple structures of these specific movements in ballet require extra precision to understand the demands of complex movements which are necessary to optimize turnout in young ballet dancers. The hip and ankle joints have an essential aspect in the control of balance. The main function of the ankle joint is the provision of the balance control against postural disturbance, absorption of shock during gait, and movement of the lower extremity (Mertz and Docherty, 2012). Therefore, a normal range of motion in ankle joint and muscular strength are important components to maintain the postural sway during the movements (Yu-Hyung et al., 2013; Chi-Hung et al., 1994).

Due to the increased demand for enhanced muscle strength, endurance, and anaerobic power capacity especially in the lower extremity muscles in ballet, the purpose of this study was two-fold. The first scope of this study was to evaluate isokinetic hip, knee, ankle plantar, and dorsiflexion peak moment strengths at different angular velocities to observe the effect of overload placed upon the lower extremity muscles during aerobic dance only on strength development. Also, the second rationale of this study was to evaluate whether the post operation screening of injured dancers showed drastic changes in mean work, power, and moments compared to pre-injury screenings.

METHODS

Participants:

Before participating in the study, all subjects gave a written informed consent according to Mersin University Local Ethical Committee (Chairperson: Dr. Bahar TUNÇTAN, protocol number: 632842, date of approval: 11.01.2018) and all were familiarized with the testing procedures and informed about equipment before all test sessions. Ten non-injured control and 11 injured female adolescent ballet dancers who experienced anterior cruciate ligament injury during ballet classes volunteered to participate in this study. Based on the results of the knee MRI examination, the participants were diagnosed with grade II degeneration in the dorsal horn of the medial meniscus. The dorsal horn of the lateral meniscus was found partially extended into the intercondylar notch compatible with the bucket handle tear in the MRI examinations. An abnormal contour and heterogeneous edema signal increase was noted along anterior cruciate ligament and medial collateral ligament consistent with grade II sprain. The level of knee joint fluid was slightly increased and an effusion compatible with suprapatellar plica was also noted in suprapatellar fossa in all screenings.

Test Procedures:

All participants gave written informed consent prior to participating with the study approved by Institutional Review Board in accordance with the ethical standards of the Helsinki Declaration. All participants were informed about equipment and familiarized to the

experimental procedures before they underwent testing sessions. The anthropometric parameters of participants were expressed as Mean±SD. The anthropometric parameters (body fat mass, lean body mass, body weight) were assessed using Bioelectrical impedance analysis (Tanita 418-MA Japan) prior to Cybex isokinetic test sessions. Heights of the participants were measured with a stadiometer in the standing position (Holtain Ltd. U.K.). All test sessions were conducted with 48 hours intervals.

60 °/s and 180 °/s Isokinetic Peak Moment Knee Muscle Strength Testing:

Prior to the isokinetic knee extension and flexion peak moment measurement, the participants were seated in the upright position with the hips flexed at an angle of 90° and through pelvic and thigh straps the hips and thighs of participants were stabilized. Before the test session participants performed dynamometer trials over a series of 10 submaximal repetitions (about 50 % maximum voluntary contraction), both during flexion and extension at 180°/s.

Following on the warm-up session, they performed 5 maximal bilateral knee extension repetitions in an isokinetic test protocol at an angular velocity of 60°/s and 180°/s to determine isokinetic peak moment strength. The participants were asked to perform as quickly as possible and at a maximal effort. They were also told to grasp the handles at the sides of the chair throughout the warm-up and the test. Gravity correction was implemented prior to the isokinetic test protocol session. The participants underwent the same protocol for both legs during all isokinetic testing sessions. The hamstrings-to-quadriceps strength ratios (H/Q ratio/eccentric to concentric), calculated as the hamstrings peak moment divided by the peak moment of the quadriceps within the same limb.

Isokinetic Muscular Endurance Capacity Testing Protocol:

Upon arrival to the laboratory for the next visit, the participants underwent same warm-up routine and performed 50 maximal bilateral knee extension repetitions at an angular velocity of 180°/s to determine muscle endurance capacity. They were asked to perform as quickly as possible but typically not at a maximal effort. The mean work, power and moment of knee extension and flexion moment for repetitions 1-5, 21-25 and the last five repetitions of endurance test was determined to use in calculations. For example, the decline in endurance performance during the 50 repetitions of reciprocal knee contractions was determined: (MME of first 5 reps - MME of last 5 reps / MME of first 5 reps). This formula was also used to determine the mean moment, work, and average power for repetitions 21-25 or the final five repetitions relative to the first five repetitions. The participants underwent the same protocol for both legs during all isokinetic testing sessions. The fatigue rate was calculated as follows (Kawabata et al., 2000).

(Maximum moment of the first 5 knee bends – the maximum moment of the last 5 knee bends) / maximum moment of the first 5 knee bends x 100

60 °/s and 180 °/s Isokinetic Peak Moment Ankle Muscle Strength Testing:

In the following test session, ballet students underwent isokinetic measurement at an angular velocity of 60°/s and 180°/s in the supine position to determine absolute (Nm) and relative (Nm/kg) ankle plantar flexion and dorsiflexion peak moment. Additional straps were used to stabilize the participant during ankle testing. Ankle ROM was determined as the participant's maximum plantar and dorsiflexion. After the standard joint specific warm-up and 2 minutes of rest, ballet students performed 5 maximal concentric plantar flexion repetitions at 60°/s and 180°/s. At the end of each repetition, participants were told to relax and the ankle was returned to the starting position. Participants performed 5 concentric maximal dorsiflexion repetitions at 60°/s and 180°/s.

60 °/s and 180 °/s Isokinetic Peak Torque Hip Muscle Strength Testing:

On the fourth visit to the laboratory, participants laid supine on the dynamometer chair with the chair back completely flattened to measure hip flexion/extension peak moment strength at an angular velocity of 60°/s and 180°/s. The tested hip was at 0° of flexion, with 90° of knee flexion, and secured into a brace. The tested thigh was strapped to the dynamometer pad at femur level. The non-tested thigh was stabilized to the dynamometer chair at 0° of hip flexion. The pelvis and trunk were strapped to the dynamometer chair to prevent undesirable movements

throughout the test. Gravitational corrections were made prior to all test sessions to avoid the effect of limb weight on moment production.

Wingate (WAnT) Anaerobic Power Performance Assessment:

electronically braked Monark 864. All participants performed a standardized warm-up, which consisted of 4 min of steady state pedaling at 60 revolutions per minute (rpm), interspersed with three 2-to 3-s periods of all-out cycle sprints preceded each WAnT. Seat height was adjusted to each participant's satisfaction, and clips with straps were used to prevent the feet from slipping off the pedals. Each participant cycled 30 s against constant resistance. For female participants resistance was set to 0.53 N·m per kilogram body weight. Participants were instructed to pedal as fast as possible throughout the test period and were verbally encouraged throughout the test. In each test maximal power output, mean power output, minimal power output, and fatigue index were measured. All power output measurements are based on 5 s averages that were calculated by the WAnT computer software and were reported in watts per kilogram (W/kg). Maximal power output (peak power) was calculated from the highest 5 s work output. Mean power output, which reflects the anaerobic capacity, was calculated as the mean power output throughout the 30 s of the test. Minimal power output was calculated as the lowest 5 s work output. Fatigue index was calculated as the percentage of power output drop from the maximal power output throughout the test.In each test maximal power output, mean power output, minimal power output, and fatigue index were measured. All power output measurements are based on 5 s averages that were calculated by the WAnT computer software and were reported in watts per kilogram (W/kg). Maximal power output (peak power) was calculated from the highest 5 s work output. Mean power output, which reflects

On the fifth visit to the laboratory each participant underwent a Wingate test (WAnT) on an

the anaerobic capacity, was calculated as the mean power output throughout the 30 s of the test. Minimal power output was calculated as the lowest 5 s work output. Fatigue index was calculated as the percentage of power output drop from the maximal power output throughout the test.

Statistical Analysis:

Descriptive statistics were used to summarize data whilst Spearman's Rank-Order Correlation analysis determined the correlations of the variables at a 95% confidence interval. A non-parametric Mann-Whitney U test was used to compare inter-group and intra-group differences. The level of statistical significance was set at $p<.05$ and $p<.001$ for all comparisons. The statistical analysis was performed with SPSS version 20.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Ten healthy (age:13.36±0.17years; height: 160.10±3.27cm, body weight: 47.14±6.25kg, percent body fat: 20.11±5.55%, lean body mass:37.30±4.35kg, years of sports participation: 5.13±4.26years, years on pointe: 2.01±1.21years) and 11 injured (age:13.15±2.35years; height: 162.33±5.24cm, body weight:48.45±6.56kg, percent body fat: 24.31±6.65%, lean body mass: 35.30±2.57kg, years of sports participation: 5.11±1.25years, years on pointe: 2.12±3.01) female adolescent ballet dancers voluntarily participated in this study. Descriptive data of ankle range of motion parameters of participants are shown as mean±standard deviation (Mean±SD) in Table 1.

Table 1. Range of motion parameters of participants during plantar flexion and dorsiflexion measurements at 60 °/s and 180 °/s angular velocity (Mean±SD).

Variable (n=21)	60°/s Right (°)	60°/s Left (°)	180°/s Right (°)	180°/s Left (°)
Plantar Flexion	51.45±11.50	51.00±11.23	50.36±12.62	47.18±9.66
Dorsiflexion	23.36±7.28	19.73±8.09	19.55±12.08	20.91±8.84

Comparison of isokinetic strength parameters of participants:

Based on the results of the Mann Whitney U analysis there was a significant difference in 60°/s dorsiflexion peak moment parameters between dominant and non-dominant limbs (U=23.00, Z= -2.474, p<0.05). However, no significant difference occurred between 180°/s ankle plantar and dorsiflexion, hip and knee isokinetic peak moment parameters of the participants (Table 2).

Table 2. Isokinetic plantar flexion and dorsiflexion, knee and hip extension-flexion peak moment parameters (n=21).

	60°/s Right (Nm)	**60°/s Left** (Nm)	**180°/s Righ** (Nm)	**180°/s Left** (Nm)	**60°/s Right** (Nm/kg)	**60°/s Left** (Nm/kg)	**180°/s Right** (Nm/kg)	**180°/s Left** (Nm/kg)
PF	48.18±15.99	43.91±17.09	39.73±13.57	41.36±10.19	1.06±0.39	0.95±0.30	0.89±0.33	0.93±0.29
DF	24.18±15.65*	34.45±13.82*	26.10±11.73	28.91±10.34	0.54±0.34	0.80±0.46	0.58±0.26	0.64±0.23
KE	114.91±21.09	115.82±24.26	92.00±17.87	94.10±20.02	2.56±0.64	2.57±0.71	2.04±0.51	2.08±0.53
KF	60.19±8.61	58.82±10.01	49.00±9.63	48.73±11.44	1.32±0.20	1.30±0.28	1.07±0.19	1.07±0.26
HE	132.91±32.81	125.18±31.47	100.00±23.6	89.73±22.94	2.96±0.88	2.80±0.91	2.22±0.67	2.01±0.74
HF	66.36±16.00	58.00±14.11	61.36±8.33	63.10±11.66	1.45±0.29	1.28±0.31	1.34±0.12	1.42±0.41

Mean±SD. **Note.** PF: Plantar flexion, DF: Dorsiflexion, KE: Knee extension, KF: Knee flexion, HE: Hip extension, HF: Hip Flexion. Absolute peak moment parameters were reported as "Nm". Peak moment parameters were also normalized with body weight and reported as "Nm/kg". Asterisk * indicated p<0.05.

The results of the Mann Whitney U analysis revealed that mean declines in work, power and moment generated during 50 repetitions of isokinetic fatigue test were found significantly different between healthy and injured ballet dancers. Work, power and moment parameters in injured ballet dancers were found significantly lower between the repetitions of 1-to 5, 21-to-25 and last five repetitions of isokinetic fatigue test compared to health control group (Table 3).

Table 3. Work, power and mean moment parameters generated during 50 repetitions of an endurance test (n=21).

Endurance Measures		**Repetitions 1- 5**		**Repetitions 21-25**		**Last 5 Repetitions**	
		Extension	**Flexion**	**Extension**	**Flexion**	**Extension**	**Flexion**
Work (Joules)	Control	70.16±13.73	34.92±11.23	50.82±10.56	19.60±5.15	35.96±6.85	10.46±4.66
	Injured	55.15±10.43**	25.80±10.12*	41.70±9.47*	12.50±5.15*	30.62±6.85*	8.57±2.25
Power (Watt)	Control	228.94±41.47	62.28±16.15	166.46±33.37	36.22±8.81	112.88±18.74	21.58±9.07
	Injured	198.42±35.87**	51.17±11.12**	129.38±28.21**	30.17±7.56*	100.13±11.41*	16.53±11.23*
Moment (Nm)	Control	73.86±13.22	38.04±9.14	53.80±10.72	24.92±6.64	36.62±6.08	16.32±5.20
	Injured	61.27±11.26**	30.42±10.25*	48.21±9.56*	19.52±7.58*	29.21±8.35*	10.51±6.27*

Mean±SD. **Note.** *p<0.05, **p<0.001

To determine the magnitude of injury on fatigue test performance mean declines in work, power and moment occurred at specified intervals during 50 repetitions of isokinetic fatigue test was found as follows. Percent decline in work, power and moment parameters in injured ballet dancers were found significantly lower between the repetitions from 1-5 to 21-to-25 and 1-5 to last five repetitions of isokinetic fatigue test compared to health control group (Table 4).

Table 4. Percent decline in mean work, power and moment parameters during 50 repetitions of an endurance test

Percent Decline (%)		**Repetitions 1-5 to Repetitions 21-25**		**Repetitions 1-5 to Last 5 Repetitions**	
		Extension	**Flexion**	**Extension**	**Flexion**
Work (Joules)	Control	15.21±13.52**	35.33±11.25*	40.28±6.93*	55.53±12.21**
	Injured	27.04±10.09	42.37±10.88	48.38±5.88	67.48±13.82
Power (Watt)	Control	20.90±10.21*	35.03±14.26*	41.25±7.37**	55.25±11.43*
	Injured	26.94±9.42	41.02±10.40	50.21±6.25	63.88±14.08
Moment (Nm)	Control	20.21±10.01*	29.35±11.12*	40.21±7.35*	50.52±10.07*
	Injured	26.77±9.85	34.15±12.70	49.92±6.59	56.60±11.90

Mean±SD. **Note.** *p<0.05, **p<0.001

The decline in anaerobic power capacity during Wingate test was reported as shown below. The specified declines at each intervals showed significant changes between injured and healthy control group (Table 5).

Table 5. The changes in power parameters during WAnT test (Mean±SD).

		Peak power (Watt)	**Average power** (Watt)	**Minimum power** (Watt)	**Percent Decline** (%)	**Power drop** (Watt)
Power (Watt)	Control	293.00±75.47	251.48±51.50	97.51±45.53	66.72±32.10	195.49±83.23
	Injured	279.93±70.34**	204.53±54.59**	81.63±73.48**	72.42±32.10*	198.29±83.23

Note. *p<0.05, **p<0.001

Correlations among lower extremity strength characteristics:

There was negative significant correlations among body weight, 60 °/s relative left dorsiflexion and 180° relative right plantar flexion (r=.736, p<.001; r=.713, p<.001) and also H:Q Ratio and non-dominant limb 60 °/s relative knee flexion, right leg 60 °/s relative knee extension, and left leg 60 °/s relative knee flexion strength (r=.60, p<.05; r=.825, p<.001; r=.701, p<.05), respectively. Additionally, there was also a negative correlation between mean anaerobic power performance during Wingate and ankle plantar flexion muscle strength (r= –.635, p<.005). However, the results of Spearman's rank-order correlation analysis indicated positive significant correlations among extension fatigue index, KE ^{MWD} 1-5 to last 5 reps, KE ^{MPD} 1-5 to last 5 reps, KE ^{MMD} 1-5 to last 5 reps (r=.831, p<.001; r=.961, p<.001; r=.969, p<.001); flexion fatigue index, KF ^{MWD} 1-5 to last 5 reps, KF ^{MPD} 1-5 to last 5 reps, KF ^{MMD} 1-5 to last 5 reps (r=.818, p<.001; r=.837, p<.001; r=.931, p<.001), respectively (Table 6).

Table 6. The correlation between isokinetic peak moment, body weight and H:Q ratio parameters.

Variable	**Body Weight** (kg)	**H:Q** (%)	**WAnT Mean Power** (Watt)	**Extension Fatigue Index** (%)	**Flexion Fatigue Index** (%)
DF^{Left} 60°/sec (Nm/kg)	- 0.736**				
PF^{Right} 180°/sec (Nm/kg)	- 0.713**		–.635*		
KF^{Left} 60°/sec (Nm/kg)		-0.602*			
KE^{Right} 60°/sec (Nm/kg)		-0.825**			
KE^{Left} 60°/sec (Nm/kg)		-0.701*			
KE ^{MWD} 1-5 to 46-50 (reps)				.831**	
KE ^{MPD} 1-5 to 46-50 (reps)				.961**	
KE ^{MMD} 1-5 to 46-50 (reps)				.969	
KF ^{MWD} 1-5 to 46-50 (reps)					.818**
KF ^{MPD} 1-5 to 46-50 (reps)					.837**
KF ^{MMD} 1-5 to 46-50 (reps)					.931**

Note. *p<0,05, **p<0,01, PF: Plantar flexion, DF: Dorsiflexion, KE: Knee extension, KF: Knee Flexion. MWD: Mean work drop, MPD: Mean power drop, MMD: Mean moment drop. Absolute peak moment parameters were reported as "Nm". Peak moment parameters were also normalized with body weight and reported as "Nm/kg".

DISCUSSION

Training load is a major component of the process of adaptation of the body functions and it helps athletes to prolong the amount of work of a certain type and intensity during a physical exercise, training session, or training cycle (Terjung, 1995). As a result of this long term adaptive process the organism may show different adaptations to given stimulus and may lead to various injuries. Especially, branches such as aerobic dance requires a precision upon muscle groups of lower extremity to avoid dance-related injuries. Based on the results of the current study it could be speculated that significant discrepancies occurred between dominant and non-dominant dorsiflexor peak muscle strength moments may have resulted from the overloads placed upon a single joint or ballet-specific single-leg dominant movements that comprises the majority of standard daily ballet classes (Table 2). Due to the extent to which ballet-specific single-leg dominant movements during aerobic dance only classes, dancers are mostly prone to limb dominancy and unless they are left-footed, ballet dancers are generally tend to use their left leg as dominant leg during landing following sudden jumps or movements such as pirouette and fouette, and these specific movement combinations constitute a great amount of ballet performance and daily ballet classes. According to the results of the current research, a 48.38% decline in work, 50.21% in power, and 49.92% in mean moment performance during knee extension and a 67.68% decline in work, 63.88% in power and 56.60% in the mean moment occurred in the knee flexion during repetitive reciprocal contractions (Table 4). It may have been a significant indication as to why the ballet dancers suffered from ACL injury during the long term ballet classes. Due to the lack of additional strength programs in ballet curriculum the occurrence of the injury might have been attributed by fatigue and agonist-to-antagonist strength discrepancy within the same limb.

Based on the results of a study, which compares the ground reaction forces during landing en pointe and landing on the full foot, it was reported that following landing en pointe after sudden jumps dancers generated a mean maximum force of 531.14 N while 735.93 N subsequent to landing on the full foot and also generated a 72.17% of the force during landing en pointe compared to landing on the full foot (Chockley, 2008). Consequently, during these specific movements the ankle joint has a wider range of motion in jumps landing on the full foot and especially during en pointe, due to the extreme plantar flexion in the ankle, the surrounding muscles requires extra precision to prevent inflammation of several tendons, especially the peroneals (Ritter and Moore, 2008). Similarly, it was found in another study that both male and female dancers have similar incidence rates of the ankle sprain, and the right leg is predominantly used during single-legged movements to ensure postural sway. As a consequence, the incidences generally occur on the right ankle for both genders (Leanderson et al., 1996). Thus, during the preparation phase of the annual ballet training curriculum, it is essential to optimize the balance between symmetric and asymmetric movement patterns to minimize injury occurrence. It is noteworthy that rather than injury prevention, teachers also need to design training programs that comprise additional strength exercises coupled with ballet classes especially concentrating upon lower extremity muscles since these group of muscles expose overload during the performance. It has been pointed out that a compressive force of up to 12 times the bodyweight is applied to the foot and ankle joints during en pointe movement (Meck et al., 2004). Thus, the limited range of motion during the single-legged jumps and gravitational force could increase the force to the foot and ankle joints compared to the double-legged jumps and increase the risk of injury. On the other hand, according to the significant negative correlations found between ankle plantar flexion strength and Wingate mean anaerobic power performance it could be speculated that injured dancers were unable to deliver the power to the ergometer pedals produced by the ankle, knee, and hip joints (Table 5). With this in mind, it should be noted that lack of symmetrical strength improvement of lower extremity muscles before return to dance would also cause the lower extremity to expose to excessive forces and motions placed upon the injured joint which could possibly increase the re-injury risk during early dance reintegration.

The results of correlation analysis also showed significant inverse interactions between body weight and relative 60°/s left dorsiflexion and 180°/s left plantar-flexion, respectively (Table

6). It could be speculated from these results that the ankle joints of participants are unable to tolerate the body weights especially during pirouette movement, which performed on the left leg and increase the potential risk of ankle sprain or knee injuries resulted from the improper alignment of ankle joints during this repetitive and exhaustive movement. The studies to date clearly pointed out that due to the overuse of the ankle and knee joints in ballet, the most of the injuries occur in the lower extremity (Garrick and Requa, 1993). Especially, in the development of early-onset arthrosis, joint laxity is one of the most prevalent disorders in ballet dancers (Nechaev and Vasil'ev, 2018). Notably, during some specific movements, the rearfoot undergoes excessive supination which results in increased pressure on the lateral region of the ankle correlated with the "moment-angle" relationship (Fearon et al., 2015; Xia and Rymer, 2004). Thus, it can be asserted that these constant movements which comprise a great deal of ballet performance gradually increase joint loadings in both knee and ankle as the weight increased. According to the results of another study, the girls reach the highest degree of general joint laxity at the ages of 15 (Jansson, 2004). Therefore, especially due to the plantar and dorsiflexion strength deficiency, the ankle surrounding muscles should be strengthen in a symmetrically in order to prevent the injuries when the frequency of the general joint laxity is taken into account at these ages. Besides, it was also reported that during the higher limb velocities ankle weakness specifically appears in dorsiflexor muscles and the strength deficiency appeared in dorsiflexion has an important role underlying poor balance and which may in turn increase the risk of injury during aerobic dance performance (Ikezoe et al., 2003).

CONCLUSION

Based on the results of the changes in work, power, and moment changes attributed by fatigue in injured dancers during muscle endurance testing, it should be noted that adolescent ballet dancers need to employ additional strength programs to improve dance performance and to prevent the incidences of re-injury resulted from reduced muscular strength and fatigue without interfering with aesthetic demands. An awareness of the necessity of the supplemental strength programs will enable dancers and their teachers to develop new training systems, to employ more effective injury prevention programs, and to improve better physical conditioning strategies. Also, it would be possible to control the development of physical conditioning levels of the dancers with the proper selection of training loads.

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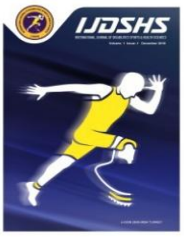

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RESEARCH ARTICLE

Is Nationality A Factor Affecting Serve Type, Serve Speed and Success In Professional Volleyball League?

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Abstract

In professional volleyball, serving is one of the most important attacking options. A strong and qualified service is important to be successful in the game. There is limited research about comparison of native and foreign volleyball players and also no research was found about Turkish players. The aim of our study was to determine if being a national or a foreign player affects serve speed, serve type and success. Total of 6168 serve shots were included in our study. Four groups were determined as native woman players (n=1836), foreign woman players (n=1036), native man players (n=1886) and foreign man players (n=1410) serve shots. Serve speeds were measured by using Radar Gun (Pocket Radar, Santa Rosa, CA, USA). Serve types and serve efficiencies were recorded during game. There was significant difference between the groups in terms of serve speeds ($F=1012.618$ $p\leq0.01$). Also statistically significant difference was found bet ween four groups for serve types ($p\leq0.01$) and serve efficiencies ($p=0.028$). Our results might be a result of training type used from the beginning of sports life of the volleyball player. When we consider the findings, we think that the speed, type and effectiveness of serves should be evaluated and followed for training and tactical development.

Keywords
Sports; Volleyball; Match analysis; Serve analysis

1. INTRODUCTION

Volleyball is a complex sport demanding technical, tactical and athletic performances of the player (Moras et al., 2008). To provide success in these performances, authors stated that efficient components of volleyball success are related to technical service characteristics (type of service and service speed) (Quiroga et al., 2012), height of contact, ball direction, ball speed (Palao & Valades, 2009), team category, points obtained in the break point phase, number of reception errors, and number of blocked attacks by the opponent (Peña, Rodríguez-Guerra, Buscà, & Serra, 2013).

In professional volleyball, serving is one of the most important attacking options. A strong and qualified service is important to be successful in the game. With the improvement in serve effectiveness, player can limit or avoid the opponent teams attacking options and therefore contribute defense (Fernandez-Echeverria, Gil, Moreno, Claver, & Moreno, 2015; García-de-Alcaraz, Ortega, & Palao, 2016).

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The different kinds of serve are categorized and named according to the ball movement after being hit (i.e., floating or with rotation) and whether or not the server is touching the ground (i.e., standing or jumping) (García-de-Alcaraz et al., 2016) . With all this in mind, the serve can be classified as Jump Topspin, Jump Float and Tennis (Jiménez-Olmedo, Penichet-Tomás, Sáiz-Colomina, Martínez-Carbonell, & Jove-Tossi, 2012; Moras et al., 2008). Although jump serve has a higher failure percentage than other service styles, all high-level teams seem to accept the high risk of error related to this style. When past studies are examined, it was reported that one of the 5 jump serve is net or out of play whereas the rate for other services is approximately 1 in 12 (Moras et al., 2008). Given this situation, it's not fully true to examine the effect of jump serve only according to the ace points or the serves which opponent can't receive easily. Here, rather than the direct successes brought, the conditions that impede should be evaluated. As mentioned in previous studies, in a high-level volleyball attack is a stronger predictor than defense for the success of the team (Moras et al., 2008). Given all this, Jump Serve is the most powerful technique in terms of increasing defensive difficulties but, at the same time, it has high percentage of errors (Ciuffarella et al., 2013).

There is limited research about comparison of native and foreign volleyball players and also no research was found about Turkish players. Therefore the aim of our study was to determine if being a national or a foreign player affects serve type, serve speed and success during one season in Elite Men's and Women's Volleyball-League.

2. MATERIALS AND METHODS

Ethical approval for this study was obtained from Başkent University Non-interventional Clinical Researches Ethics Board (KA20/398). Written informed consent was obtained from all subjects before the study.

2.1. Subjects & Groups

Total of 6168 serve shots were included in our study. Four groups were determined as native woman players serve shots (n=1836 shot), foreign woman players serve shots (n=1036 shot), native man players serve shots (n=1886 shot) and foreign man players serve shots (n=1410 shot). All evaluations were taken during the 2016-2017 Volleyball Eagle League and Sultan's Volleyball League Seasons.

2.2. Serve Speed

Two experts (sports trainers) have observed recorded data during competition. Tests were performed by the same examiner on all athletes to avoid inter-tester inconsistencies. A radar gun (Pocket Radar, Santa Rosa, CA, USA) was used to simultaneously measure ball velocity from behind the strike zone. Serve speed was recorded as miles per hour (MPH). The radar records the speed of an object by the emission and reception of radio waves (Palao & Valades, 2009). The radar was positioned on the platform placed for statistical trainees at the back of the field, at a distance of 5 m from the service line, 1.5 m above the ground. The radar direction is reversed according to the service area (Moras et al., 2008; Tocci et al., 2017).

2.3. Serve Type & Serve Efficiency

The second observer had recorded serve type and serve efficiency.

Serve types were recorded as Jump Topspin, Jump Float and Tennis. In JUMP TOP SPIN, player starts behind the line, throws the ball up and forward. At the same time runs forward and jumps at the end line, meets the ball in the air and executes a spike. In JUMP FLOAT, player starts behind the line, throws the ball up and forward. At the same time runs forward and jumps at the end line, meets the ball in the air, hits the ball hard to stop the spin of ball. Keeping the ball from spinning creates a float effect. In TENNIS, player stands little behind from end line or at the end line, than throws the ball up and hits the ball (A. Katsikadelli, 1996; Moras et al., 2008).

Serve efficiencies were divided in 4 categories: 1) Ace= direct point from that serve 2) Error= outside 3) Positive= successful, the opponent can't receive easily 4) Negative= poor, the opponent receives easily. Serve success was recorded as win or lost.

2.4. Statistical Analysis

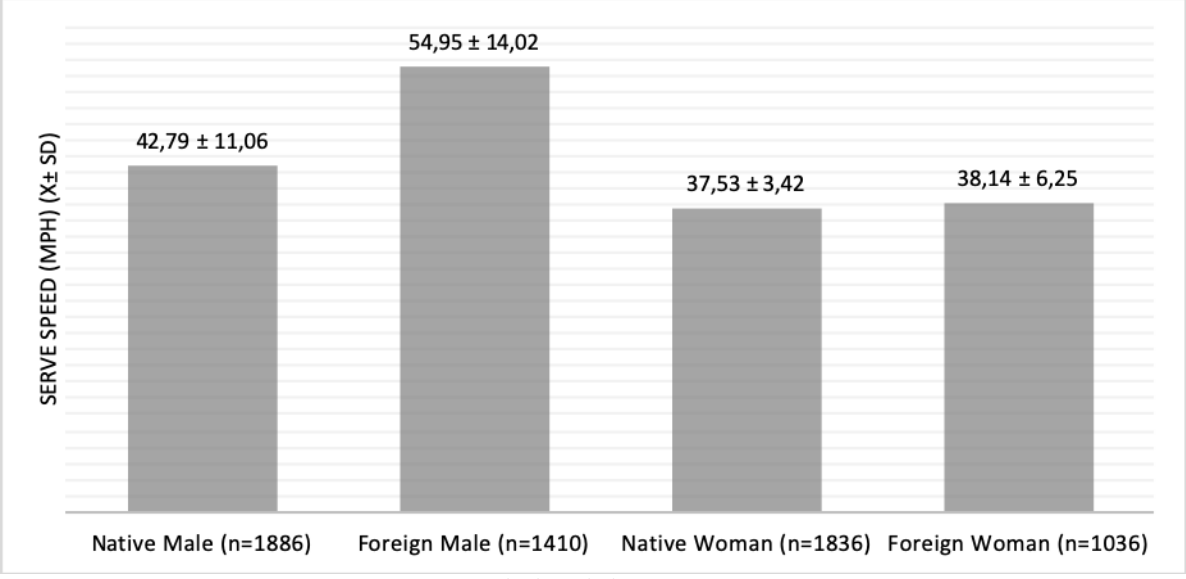
Statistical analysis was performed with the IBM SPSS Statistics V22 software. The mean and standard deviation of the data are represented. α value of 0.05 was taken to indicate statistical significance. Kolmogorov-Smirnov/Shapiro Wilk tests were done to assess the homogeneity of four groups. Comparisons between serve speeds of four groups were analyzed with ANOVA. Serve types, serve efficiencies and results of four groups were

specified as percentiles (%). Chi-Square Test was used to analyze differences between four groups in serve types, serve efficiencies and results.

RESULTS

Native man, foreign man, native woman and foreign woman serve shot groups were included in multiple comparisons which were statistically homogeneous.

There was significant difference between the groups in terms of serve speed ($F=1012.618$ $p\leq0.01$). In binary comparison of groups, a significant difference was found between native and foreign man players ($p<0.001$) when there was no significant difference between native and foreign woman players ($p=0.355$). Difference of man players are in favor of foreign players (Native 42.79±11.06, Foreign 54.95±14.02 MPH). Number of players in each group and Mean ± Standart Deviation values of serve speeds were given in **Chart 1**. According to the Chi-Square Test, statistically significant difference was found between four groups for serve type ($p\leq0.01$) and serve efficiencies ($p=0.028$).



MPH: Miles Per Hour ; X±SD: Mean ± Standard Deviation

Chart 1. Serve speeds of each group

Percentiles of serve types are shown in **Table 1** and serve efficiencies are shown in **Chart 2a, Chart 2b**.

Table 1. Nationality - Serve Type Frequencies

			Serve Type			
			Jump Topspin	Jump Float	Tennis	Total
Nationality	Native man	Count	**527**	**1354**	**5**	1886
		% within Nationality	**27,9%**	**71,8%**	**,3%**	100,0%
	Foreign man	Count	**1019**	**391**	**0**	1410
		% within Nationality	**72,3%**	**27,7%**	**,0%**	100,0%
	Native woman	Count	**29**	**1586**	**221**	1836
		% within Nationality	**1,6%**	**86,4%**	**12,0%**	100,0%
	Foreign woman	Count	**134**	**577**	**325**	1036
		% within Nationality	**12,9%**	**55,7%**	**31,4%**	100,0%
Total		Count	1709	3908	551	6168
		% within Nationality	27,7%	63,4%	8,9%	100,0%

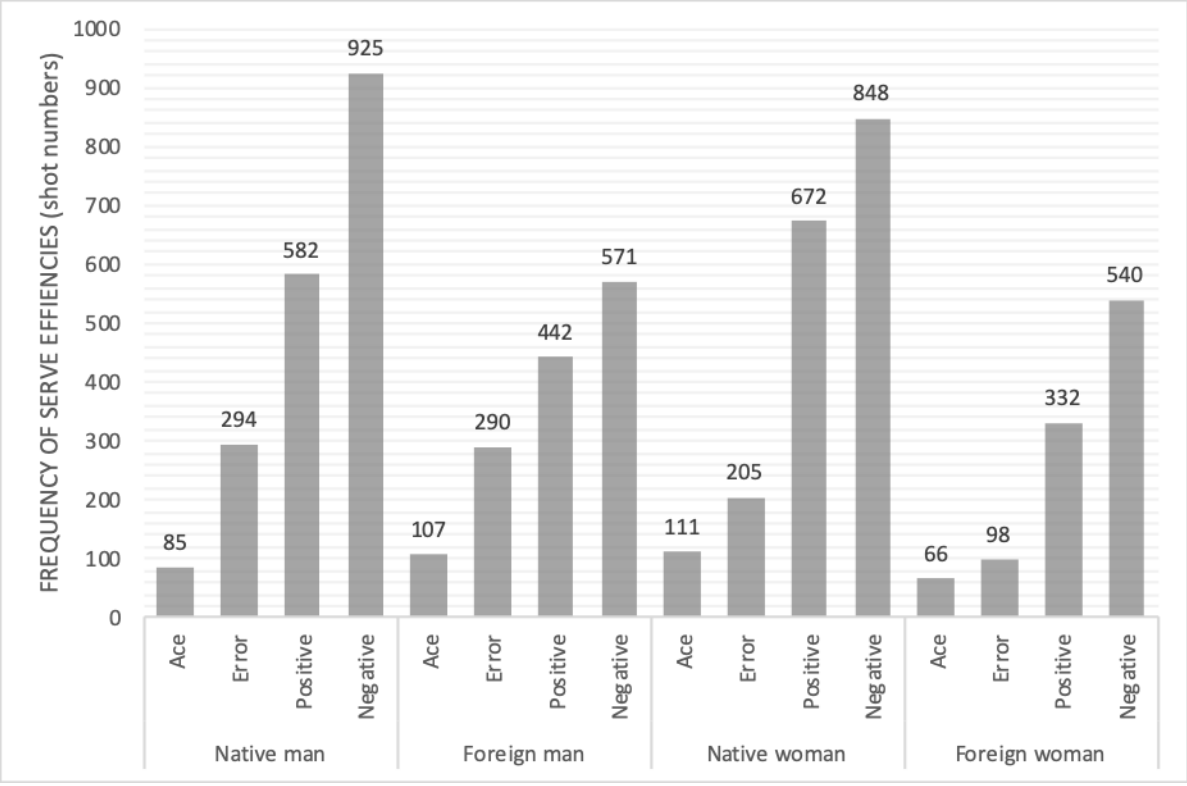


Chart 2a. Frequency of serve efficiencies

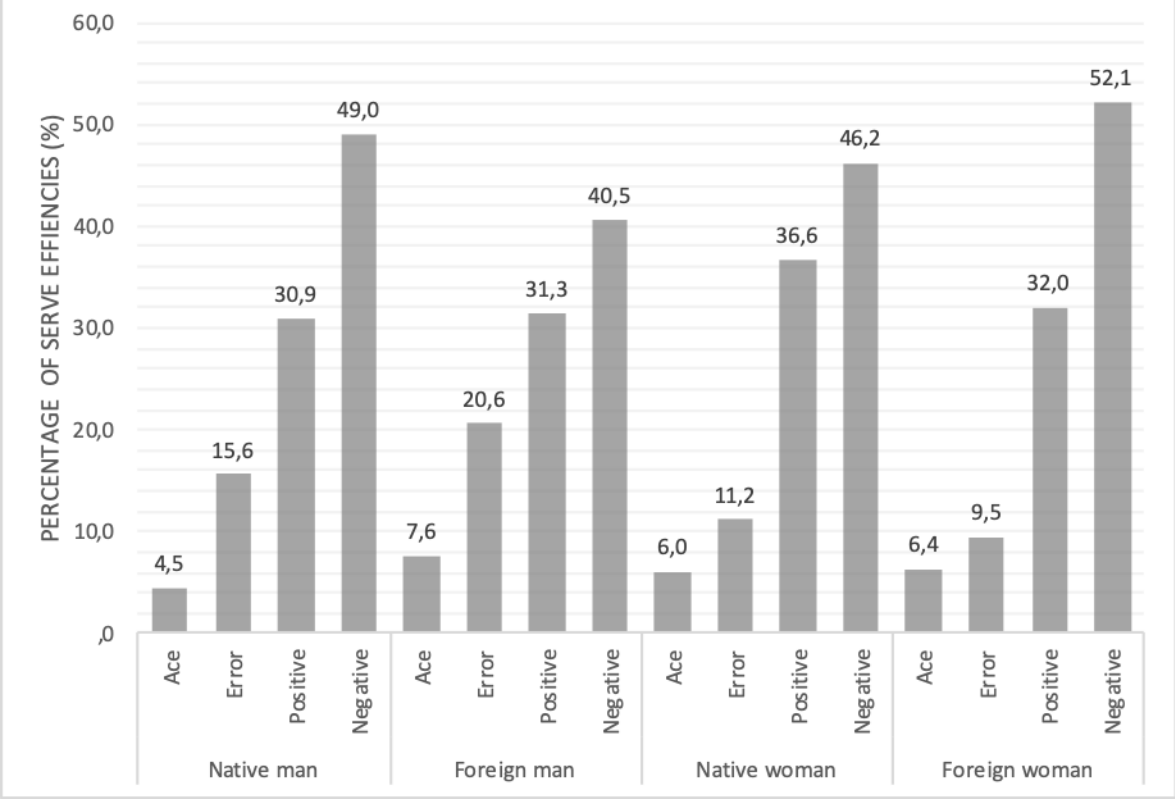


Chart 2b. Percentage of serve efficiencies

4. DISCUSSION

This study aimed to determine if nationality and gender of the player affects serves type, serve speed, serve efficiency and result of the point during a season in Professional Volleyball League. It is found that serve speed of foreign men are better than Turkish men volleyball players but in women players there is no difference in terms of serve speed. We also found that serve type is different in man players; as foreign players mostly use Jump Topspin serve type and Turkish players mostly use Jump Float serve type. In women players, most frequent serve type is Jump Float (Native 86.4%; Foreign 55.7%). Native women players mostly use Tennis serve (12.0%) whereas Foreign women mostly use Jump Topspin serve (27.7%). However, we found that the serve efficiency and success of the players does not change at all.

Radar gun is found as a reliable assessment tool for measuring serve speed (Kolman, Huijgen, Kramer, Elferink-Gemser, & Visscher, 2017). Technological improvement has permitted the radar to be used in sport research and training to monitor spike speed instead of using photogrammetry (Melrose, Spaniol, Bohling, & Bonnette, 2007). We measured the serve speed with radar gun during the game in order to see the real efficiency of the player in the game. Considering serve speeds of elite male volleyball players (n=3296 serves) during the game, we saw that Turkish players have a mean of 42.79 MPH while foreign players have a mean of 54.95 MPH as serve speed. Therefore, as comparing the mean serve speeds of Native and Foreign volleyball players, we may say that Foreign players have higher serve speed than Native players. The reasons of this situation might be affected by many factors such as volleyball players' jump capacity or body mass index. Especially strength performance of the dominant shoulder (internal rotators) in volleyball players is found to be a main factor affecting serve speed (Forthomme, Croisier, Ciccarone, Crielaard, & Cloes, 2005).

A study of Quiroga et al. showed that the most efficient component of volleyball success was related to technical service characteristics (type of service and service speed) (Quiroga et al., 2012). Three types of serve are defined used during the game: Jump Topspin, Jump Float and Tennis (Jiménez-Olmedo et al., 2012; Moras et al., 2008). In our study, serve type is also found different in Foreign and Native man but not in woman players. As a result of our study, it is determined that Foreign man players use mostly Jump Topspin serve type whereas Native man players use mostly Jump Float serve type. Native and foreign woman players use mostly Jump Float serve. In different study Ciuffarella et al, confirmed that in Italian volleyball male Top League, there is the largest use of the Jump Top Spin (69.9%), followed by the Jump Float (26.9%) and the Tennis Serve (3.3%). Our results might be a result of training type used from the beginning of sports life of the volleyball player. Also another reason might be that Jump Float which Native volleyball players mostly use is a more targeted and guaranteed serve type than Jump Topspin which seems more risky because it is not targeted. As some authors have noted, what is important is that the player feels physically and psychologically comfortable with the type of serve he uses, that brings the success (Afonso, Esteves, Araújo, Thomas, & Mesquita, 2012; Macquet, 2009).

Beside a point which is immediately scored, the serve is also important for the later development of the game. Thereby, it has been reported that with an effective serve, reception performance (Quiroga et al., 2010, 2012) and the attacking options of the opposite team are affected and with this effect, first tempo attacks can be reduced and second tempo attacks can be increased (A. Katsikadelli, 1996; Papadimitriou, Pashali, Sermaki, Mellas, & Papas, 2004). This effect of the serve on the attack performance can cause an increase in blocking options (Fernandez-Echeverria et al., 2015). Also Ciuffarella et al, investigated the effectiveness of serve types and refers to the necessity of using different types of services in different parts of the game (Ciuffarella et al., 2013). Thus in Professional volleyball it is highly important to start with effective serve which can limit opponents attact options and helps for defence. In our study according to the serve efficiency (ace, error, positive, negative) percentages are almost equal in all groups. 46.8% of all serves are categorised as 'negative'. This results suggests that we need to change service effectiveness to 'positive' when we are thinking about training and tactical development.

As considering all of these results, the success of the serve is found similar in both Foreign and Native volleyball players. Many authors have pointed out that there are many factors affecting the success of the serve. Palao et al. stated that the success of the action depends on height of contact, ball direction, and ball speed (Palao & Valades, 2009). Also Pena et al. stated that team category, points obtained in the break point phase, number of reception errors, and number of blocked attacks by the opponent were significant predictors of winning or losing the matches (Peña et al., 2013). The parameters measured in our study indicated that although serve speeds of Foreign players are higher and two groups use different serve types, the success of the serve might be similar for Native and Foreign players. This might lead us to the result of recruiting more Native players to national teams will bring the same success with recruiting foreign players.

Limitations and Recommendations

Even if we included many players to our study, the number of loyal players may be increased and may be compared again. The same measurements may be measured for specific teams and evaluated before and after the training season. Also to look at from another perception, the reason for the difference in service rates and the difference in service types may be explored more detailed (eg internal rotator force). It was not known whether body mass index, jumping heights and especially upper extremity muscle strength, which affect service speed, were similar in native and foreign players. This can be seen as a limitation and in future studies, the personal and physical characteristics of the players can be examined in more detail. Also, more studies should be done to evaluate technical serve characteristics, the effects on the development of the game and its consequences.

5. CONCLUSION

It is known and accepted that the most efficient component of volleyball success was related to technical serve characteristics. In our study, we shown that serve speed, type and efficiency characteristics are different in group due to the race and gender. In previous sections, we mentioned about their possible reasons of this situation. Regular monitoring of technical service features, the effects on the game's development and results are essential for success.

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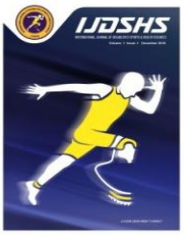

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RESEARCH ARTICLE

The Effect of Exercise Training for Refugee Wheelchair Users

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Abstract

Purpose: The aim of this study was to investigate the effect on head and shoulder posture, pain, neck disability, functional capacity, fatigue, and quality of life of exercise training applied to the upper extremity, scapular, and trunk muscles of refugees using a wheelchair because of spinal cord injury sustained in the Syrian War. Methods: The study included 24 refugees aged 20-35 years who were using a wheelchair. The subject were randomly separated into 2 groups as the control group (n:12), who recieved upper extremity strengthening exercises only, and the study group (n:12), who recieved additional scapular and trunk strengthening exercises. The exercise program was implemented 3 times a week for 4 weeks. Head and shoulder posture angular values were measured with a goniometer. Evaluations were made usingthe Wheelchair User's Shoulder Pain Index (WUSPI), Neck Disability Index (NDI), Fatique Severity Scale (FSS), Functional Independence Measure (FIM), and the World Health Organization Quality of Life short form (WHO-QoL-Bref). Results: Before treatment, the measurements of the groups were homogenous ($p>0.05$). In the post-treatment evaluations, the shoulder pain, neck disability, and fatigue severity values were significantly lower, and the functional independence and quality of life scores showed a significant improvement in the study group after the training ($p< 0.05$). Conclusion: The study results demonstrated that the addition of scapular and trunk strengthening exercise to upper extremity exercises in the rehabilitation of wheelchair users is more effective in improving head and shoulder posture, neck disability, fatigue severity, functional independence, and quality of life.

Keywords
Refugee, Wheelchair, Exercise, Quality of life

INTRODUCTION

The disabilities seen in refugees from war at all ages and in both genders include hearing, sight, and physical problems, and speech disorders. For victims of the Syrian War who are now confined to a wheelchair because of spinal cord injury and living as refugees in Turkey, when the problems of migration and refugee life are added, the frequency and severity of the difficulties encountered by wheelchair users are increased.

Spinal cord injuries (SCI) with various clinical characteristics have a pathological process with a negative effect on social, psychological, personal, and economic life. Many complications may develop following SCI, primarily several musculoskeletal system problems associated with wheelchair use characterized mainly by neck and shoulder pain and problems (Tatlı et al., 2005). It has been reported that 68% of wheelchair users experience problems in the shoulders and surrounding joints, and pain and function loss is seen in the neck, elbow and wrist, as other joints close to the shoulder (Curtis et al., 1999; Nichols et al., 1979; Curtis et al., 1995). Excessive loading and repeated activities extending the head as a result of wheelchair use have been reported to

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cause often decreased intra-articular circulation in the upper extremity joints, which leads to pain (Curtis et al., 1999). This decrease in circulation causes pain and function loss and long-term joint destruction because of joint fluid and intra-articular feeding (Subbarao et al., 1995).

In addition to the above-mentioned joint disorders, postural problems often develop in SCI patients who are wheelchair-dependent. Previous studies have shown postural problems such as anterior pelvic tilt, head anterior tilt, neck and shoulder protraction, and kyphotic posture in long-term wheelchair users because of SCI, and it has been shown that these postural deviations lay the ground for several diseases and dysfunctions (Nichols et al., 1979; Rose et al., 1988; Sakai et al., 2020).

When it is considered that the upper extremity joints are in conditions of continuous overuse in patients who have to use a wheelchair, these joints' health is critical to provide a good quality of life for these types of wheelchair-dependent individuals (Sakai et al., 2020). A decrease in physical adaptation is a serious barrier to maintaining functionality and may cause loss of independence for the wheelchair user (Tolerico et al., 2007). Therefore, to increase the exercise capacity of these individuals, their general health and quality of life should be improved (Kirby et al., 2020).

The importance of planned, structured, and repeated exercises to develop and maintain the body vitality has been stated in studies showing that individuals with SCI are inactive (Buchholz et al., 2003). With exercise interventions, SCI patients can become more physically active, and this has been shown to be an effective means of reducing preventable diseases (Kressler et al., 2014).

The importance of performing regular physical activity following spinal cord injury has been emphasized, especially the importance of exercise to encourage and maintain functional independence (Hicks et al., 2003). The focus has been on exercise programs to strengthen the upper extremity muscles in terms of reducing deterioration of the musculoskeletal system and reducing fatigue in this patient group. There is general evidence that exercises performed by wheelchair users are effective therapeutic approaches in providing trunk control, increasing functional capacity, and increasing resistance to fatigue.

There are studies in the literature that have used ergonomic changes to increase the quality of life of long-term wheelchair users (Curtis et al., 1999; Hicks et al., 2003; Harvey, 2016). However, there is no study that has investigated whether or not the above-mentioned problems can be eliminated with exercise approaches focussed on pain, fatigue, and sleep quality with the strengthening of scapula, trunk, and upper extremity muscles. Especially in the studies conducted on refugees, there has been seen to be more focus on social content evaluation. In addition to basic health requirements, to accelerate the stages of adaptation to community life and increase the quality of life, individuals living temporarily in refugee camps have been referred for therapeutic exercises to increase activity and socialization.

The aim of this study was to investigate the effect on head and shoulder posture, shoulder pain, neck disability, functional capacity, fatigue, and quality of life of exercises applied to the upper extremity, scapular, and trunk muscles of patients living in a refugee camp and using a wheelchair because of spinal cord injury sustained in the Syrian War. The study hypothesis was that the exercises applied to the scapular and trunk muscles together with the upper extremity would have a greater effect than an exercise program of upper extremity exercises only on correcting head and shoulder posture, increasing functional capacity, and decreasing fatigue levels.

MATERIAL AND METHODS

The study was conducted on individuals using a wheelchair because of SCI sustained in the Syrian War and living in a refugee camp. Approval for this randomized controlled trial was granted by the Human Research Ethics Committee of Hasan Kalyoncu University (date-decision no: 06/06/2018-2018/05). All study procedures conformed to the provisions of the World Medical Association Declaration of Helsinki. Written informed consent was obtained from all participants.

The aim of this study was to investigate the effect on head and shoulder posture, shoulder pain, functional capacity, fatigue, neck disability index, and quality of life of exercises applied to the upper

extremity, scapular and trunk muscles of patients using a wheelchair because of spinal cord injury (SCI).

24 volunteers, between age 21-29, using wheelchair due to SCI, attending a special education and rehabilitation center in the province of Hatay, were included in the study. The individuals were divided into two groups according to the simple random method as the 1st control group (n = 12) and the 2nd study group (n = 12). Only upper extremity strengthening exercises were applied to individuals in the control group, upper extremity strengthening exercises and scapular and trunk muscle strengthening exercises were applied to individuals in the study group

At the start of the study, the demographic information of all the subjects in both groups was recorded, then the Wheelchair User's Shoulder Pain Index (WUSPI), Neck Disability Index (NDI), Fatigue Severity Scale (FSS), Functional Independence Measure (FIM) and the World Health Organization Quality of Life short form (WHO-QoL-Bref) were applied. At the end of 12 training sessions completed in a 4-week period, all the evaluations and scales were applied again.

The appearance of the head and shoulder posture was photographed from the side with a digital camera (Canon 60D, Japan). Head and shoulder posture was measured using a digital goniometer with Adobe Acrobat software, with the camera at a distance of 1.5m and adjusted to shoulder height at a fixed point without turning or bending (Ahmadi et al., 2016; Ruivo et al., 2017).

Head posture is defined as the craniovertebral angle. It is the angle formed by the intersection of a horizontal line along the spinous process of C7 and the line drawn towards the ear tragus. A craniovertebral angle of <48-50° is accepted as an anterior tilt of the head (Ahmadi et al., 2016) (Figure 1).

Shoulder posture is the angle formed by the intersection of the line drawn between the midpoint of the humerus and the spinous process of C7 and the horizontal line drawn along the midpoint of the humerus. A shoulder angle of <52° indicates shoulder protraction (Ruivo et al., 2017) (Figure1).

Figure 1. A: Head angle; B: Shoulder angle

Table A. Additional exercises for the study group

• With modified push-ups in the prone position on the bed, it was aimed to strengthen the trunk extension, scapular stabilization, serratus anterior part, and arm extensor muscles.
• In the sitting position, with the exercise of pushing a roller upwards on a wall, it was aimed to work the trunk extension and bilateral inferior trapezius muscles and with the action of moving the roller downwards to strengthen the trunk flexion the serratus anterior part, and the arm extensor muscles.
• Pulling the resistance band downwards bilaterally while in a sitting position works the serratus anterior part muscles and the muscles making flexion of the trunk.
• Using the resistance band in the sitting position with bilateral shoulders at 90°, by making a scapular retraction, the rhomboid muscles are strengthened.
• In a sitting position with the arms next to the trunk and the elbow in flexion, right and left shoulder internal rotation and external rotation exercises against the resistance of the band strengthened the scapular internal and external rotator muscles.

Shoulder Pain Index

This scale was developed as the Wheelchair User's Shoulder Pain Index (WUSPI) to evaluate the severity of shoulder pain experienced during activities such as dressing, transfer, and propelling the wheelchair, and the quality of life of the patients (Curtis et al., 1999). The scale comprises 15 items in which shoulder pain severity during wheelchair use, transfers, personal care, and general activities is evaluated with a standard 10cm Visual Analog Scale (VAS) where 0 = no pain and 10 = intolerable pain. The patient is instructed to mark the VAS to indicate the shoulder pain felt during the activities in the previous week. The total score is calculated from the total of the 15 item points, in the range of 0 - 150, with 0 indicating no pain in any activity and 150 indicating the most severe level of pain in every activity. Validity and reliability studies of the WUSPI in Turkish were conducted by Yılmaz in 2017 (Yılmaz, 2017).

Neck Disability Index (NDI)

This scale was developed by Vernon and Mior in 1991 to determine the level of disability of the neck (Vernon et al., 1991). The scale includes 10 different situations to evaluate the disability status of the neck. Validity and reliability studies of the NDI in Turkish were conducted by Aslan et al., in 2008 (Aslan et al., 2008).

Fatigue Severity Scale (FSS)

The FSS, which was developed in 1989, was applied to the individuals in the study to determine the levels of fatigue. Validity and reliability studies of the FSS in Turkish were conducted on MS patients by Armutlu et al. The scale consists of a total of 9 items scored with a 7-point Likert-type response, where 1 represents complete disagreement with the statement, and 7, complete agreement. The total score is calculated as the arithmetic mean of the total item scores. A score of ≥4 generally indicates severe fatigue (Armutlu et al., 2007). The FSS was applied to the study subjects in the afternoon.

Functional Independence Measure (FIM)

The FIM, which was developed in 1993 (Hall et al., 1993), was used to determine the functional independence of the study subjects. Validity and reliability studies of the FIM in Turkish were conducted by Kucukdeveci et al., in 2001 (Kucukdeveci et al., 2001). The scale has 6 sub-dimensions which evaluate personal care, sphincter control, transfer, behavior when moving location, communication skills, and social perceptions. The sub-dimensions were evaluated by the researcher in accordance with specified criteria.

World Health Organization Quality of Life – Short Form (WHO-QoL-Bref)

This scale, developed in 1998, was used to evaluate the quality of life of the study participants. The scale comprises 26 items in 5 sub-dimensions of general health status, physical health status, psychological health status, social relationships, and support network (WHO-QoL Group, 1998). Validity and reliability studies of the WHO-QoL in Turkish were conducted by Eser et al., in 1999 (Eser et al., 1999).

Intervention

The control group subjects were applied with strengthening exercises for the upper extremities using resistance bands. With the subject sitting in the wheelchair, flexion and extension exercises were applied to the anterior, mid, and posterior deltoid, biceps and triceps, and the wrist. Under the supervision of a physiotherapist, a total of 4 weeks of exercise training was given 3 days a week and 3 sets for each muscle, with 10 repetitions, with 2-minute rest intervals.

The different colors of the resistance bands indicated different levels of resistance(http://www.therabandturkiye.com/thera-band-renkleri/,2021). The color of the band used for each subject was determined by the muscle strength values and the weekly change in the muscle strength values. The bands were changed as necessary.

The subjects in the study group were given exercises directed at the muscles of the scapula and flexion and extension muscles of the trunk in addition to the control group exercises. The exercise training was given under the guidance of a physiotherapist as 10 repetitions and 3 sets for each muscle, with 2 minutes rest between the sets, 3 days a week for 4 weeks (Table A).

Statistical Analysis

Data obtained in the study were analyzed statistically using IBM SPSS vn. 21.0 software (SPSS Inc, Chicago, IL, USA). As the data did not conform to a normal distribution, non-parametric tests were used in the analyses. In the comparisons of the mean values of two independent groups, the Mann-Whitney U test was used. The mean values within a group of the measurements taken before and after exercise training were evaluated using the Wilcoxon Signed-Rank test. In the determination of the differences between groups of categorical variables, the Chi-square test was applied. In all the data analyses, a value of $p<0.05$ was accepted as statistically significant.

RESULTS

The demographic data and some clinical characteristics of the classic exercise control group and the study group are shown in Table 1. A total of 24 males were examined, with a mean age of 24.83±0.88 years in the control group and 24.58±0.73 years in the study group ($p>0.05$). The groups were similar in respect of height, weight, educational level, smoking status, dominant side, and marital status ($p>0.05$).

Table 1. Demographic data and clinical characteristics of the study subjects

Variable		Control group (n=12) X±SD	Study group (n=12) X±SD	z	p[a]
Age (years)		24.83±0.88	24.58±0.73	-0.145	0.887[a]
Height (cm)		177.5±1.67	176±1.77	-0.522	0.630[a]
Weight (kg)		79.25±2.85	75.91±2.51	-0.867	0.410[a]
Level of Education	No formal education	2 (16.67%)	1 (8.33%)		
	Primary – middle school	4 (33.3%)	3 (25%)		
	High school	3 (25%)	4 (33.3%)		0.859[b]
	University	3 (25%)	4 (33.3%)		
Smoking status	Smoker	5 (41.67%)	4 (33.3%)		
	Non-smoker	7 (58.33%)	8 (66.7%)		0.219[b]
Dominant side	Right	9 (75.5%)	10 (83.33%)		
	Left	3 (25%)	2 (16.67%)		0.615[b]
Marital status	Married	6 (50%)	6 (50%)		
	Single	2 (16.67%)	4 (33.3%)		
	Divorced	4 (33.3%)	2 (16.67%)		0.513[b]
Spinal cord injury level	T6	1 (8.33%)	2 (16.67%)		
	T7	2 (16.67%)	1 (8.33%)		
	T8	2 (16.67%)	2 (16.67%)		
	T9	2 (16.67%)	3 (25%)		-
	T10	2 (16.67%)	2 (16.67%)		
	T11	2 (16.67%)	1 (8.33%)		
	T12	1 (8.33%)	1 (8.33%)		

*$p<0.05$; X: Mean, SD: Standard Deviation; p^a= Mann Whitney U test; p^b= Chi-square Test

The distribution of pain values in both groups is shown in Table 2. Pain in the neck and shoulders was determined in >75% of the individuals using a wheelchair because of SCI.

Table 2. Pain distribution of the study subjects

	Control group (n=12)		Study group (n=12)		
	N	%	N	%	p
Neck	9	75	10	83.33	0.615
Shoulder	9	75	9	75	1.000
Elbow	6	50	4	33.33	0.408
Hand/ Wrist	5	41.67	5	41.67	1.000

* p <0.05; Chi-square test

In the evaluations of the control and study groups, no significant difference was determined between the groups in respect of the pre-training head and shoulder posture values (p>0.05). In the posture evaluations after the 4-week exercise training period, the shoulder posture value in the study group showed a significantly greater improvement than in the control group (p<0.05). The head and shoulder posture was determined to be better in the study group (Table 3).

Table 3. Comparisons of the pre and post-training head and shoulder values of the groups

		Control Group (n=12)	Study Group (n=12)		
		X ± SD	X ± SD	z	p
Pre-training	Head	50.00 ± 2.45	51.08 ± 2.78	1.12	0.27
	Shoulder	54.83 ± 2.37	54.58 ±2.23	0.27	0.79
Post-training	Head	50.42 ± 2.71	52.92 ± 2.71	2.09	0.04*
	Shoulder	55.33 ± 2.53	57.92 ± 2.68	2.42	0.03*

*p<0.05; X: Mean SD: Standard Deviation

In the comparisons of the pre and post-training WUSPI, NDI, FSS, and FIM scores of the groups, all the scale values were seen to have significantly improved in the study group (p<0.05), and no significant improvement was determined in the control group (p>0.05) (Table 4).

Table 4. Comparison of the pre-training and post-training scores of the shoulder pain, neck disability, fatigue severity, and functional level scores of the groups

	Variables	Pre-training (n=12)	Post-training (n=12)		
		X ± SD	X ± SD	z	p
Control group	WUSPI	25.33 ± 11.26	24.88 ± 10.96	1.105	0.27
	NDI	0.39 ± 0.16	0.39 ± 0.16	0.00	1.00
	FSS	1.99 ± 0.76	1.98 ± 0.81	0.447	0.66
	FIM	80.08 ± 2.75	80.08 ± 2.75	0.00	1.00
Study group	WUSPI	23.25 ± 10.59	17.10 ± 9.97	3.062	0.002*
	NDI	0.45 ± 0.15	0.39 ± 0.14	2.950	0.003*
	FSS	1.87 ± 0.72	1.68 ± 0.69	2.831	0.01*
	FIM	80.92 ± 2.91	81.33 ± 2.81	2.236	0.03*

*p<0.05; X: Mean, SD: Standard Deviation; WUSPI: Wheelchair Users Shoulder Pain Index; NDI: Neck Disability Index, FSS: Fatigue Severity Scale, FIM: Functional Independence Measure

In the comparison of the change in the values in the groups from pre to post-training, the difference was seen in the shoulder pain, neck problems, and fatigue values of the study group were found to be statistically significant ($p<0.05$). A significant change was determined in the functional independence values of the study group after training, but no difference was found between the groups ($p>0.05$) (Table 5).

Table 5. Comparison of the differences in the pre-training and post-training scores of the shoulder pain, neck disability, fatigue severity, and functional level scores of the groups

	Control Group (n=12)	Study Group (n=12)	t/z	p
Variables	X±SD	X±SD		
WUSPI	0.21 ± 1.84	6.15 ± 2.75	-6.228	0.001[*a]
NDI	0.00 ± 1.65	0.63 ± 1.78	-3.284	0.001[*a]
FSS	0.02 ± 0.09	0.20 ± 0.13	-3.290	0.001[*a]
FIM	0.00 ± 0.43	0.42 ± 0.51	-2.000	0.114[b]

*p<0.05; p[a]: İndependent Sample test; p[b]: Mann-Whitney U test; X: Mean; SD: Standard Deviation; WUSPI: Wheelchair Users Shoulder Pain Index; NDI: Neck Disability Index; FSS: Fatigue Severity Scale; FIM: Functional Independence Measure

In the comparison of the differences in quality of life values of the groups' pre and post-training, the psychological health (p=0.001), social relationships (p=0.004), and total scale points (p=0.001) were determined to be statistically significantly better in the study group. No difference was observed in the other scores ($p>0.05$) (Table 6).

Table 6. Comparison of the differences in the pre-training and post-training scores of the quality of life scores of the groups

Quality of Life	Control Group (n=12)	Study Group (n=12)		
	X ± SD	X ± SD	z	p
General health	1.04 ± 3.60	6.25 ± 9.97	-1.739	0.082
Physical health	0.59 ± 2.56	2.77 ± 5.42	-1.119	0.263
Psychological health	0.34 ± 2.14	6.59 ± 4.84	-3.376	0.001*
Social relationships	0.69 ± 4.28	7.63 ± 6.60	-2.865	0.004*
Support network	-0.34 ± 1.92	1.30 ± 2.81	-1.798	0.072
Total measurement	0.58 ± 0.90	3.00 ± 0.95	-4.002	0.001*

*p<0.05; X: Mean, SD: Standard Deviation

DISCUSSION

Two different therapeutic exercise programs were applied to those who used wheelchairs due to SCI in the Syrian War in the refugee camp. The hypothesis established at the beginning of the study was that the addition of scapula and trunk exercises to upper extremity exercises would have a greater effect on correcting head and neck posture, increasing functional capacity, and decreasing fatigue levels than the upper extremity strengthening program alone. The study results confirmed this hypothesis.

Harvey reported that different treatment approaches could be used in SCI. It was emphasized that applications used within many standard physiotherapy practices, such as active or passive normal joint movements, strengthening exercises, and breathing exercises, could be used in treatments following SCI (Harvey, 2016).

Bayramlar, suggested encouraging sport after SCI and recommended various sports activities (Bayramlar, 2009). Previous studies have stressed the need for training on the point of exercises for wheelchair users. It has also been reported that wheelchair users need exercise intervention to achieve better health parameters (Günal et al., 2013).

In a systematic review by Hicks et al. to determine the efficacy of exercises in individuals using a wheelchair after SCI, it was reported that the efficacy of upper extremity exercises on body composition or postural correction could not be clearly seen (Hicks et al., 2011). The groups in the current study were homogenous in respect of clinical and demographic data, and this was thought to be useful in providing more cleare results in determining the effect of the training programs given between the groups. In the cases evaluated in the control group, no postural improvement was seen, whereas, in the study group, an increase was obtained in the head and shoulder angle values together with an improvement in head posture and shoulder protraction posture. Thus it can be said that the addition of the modified push-up, roller on the wall, and resistance band exercises targeted at the trunk and scapula muscles could be effective in the elimination of postural problems. Therefore, it can be considered beneficial to vary the exercises given to patients with SCI.

Being a wheelchair user with overloading and repeated overhead activities as a result of wheelchair use especially going up slopes and transfer on uneven surfaces, has been reported to cause often pain in the neck and shoulder regions and loss of function (Van Drongelen et al., 2005; Craig et al., 2012).

In literature, it has been emphasized that shoulder pain and quality of life affect each other in inverse proportion in individuals using a wheelchair after SCI (Gutierrez et al., 2007; Curtis et al., 1999). The shoulder joint is very mobile but is formed of structures vulnerable to injury, and disabled individuals using manual wheelchairs in particular, often use the head and neck, upper body and shoulder complex to compensate in functional activities. Therefore, stable and smooth working of these regions is of great importance to preserve the quality of life in these individuals. For the shoulder complex to function at the optimal level, there has to be smooth working in the form of a combination of the system including, the scapulohumeral-thoracic region (Heyward et al., 2017; Mottram, 1997). Exercise programs including this region in respect of preserving range of movement and providing a stable environment when necessary will enable the individual to be more resistant to injuries that could occur. Accordingly, it can be thought that the addition of scapula and trunk exercises to upper extremity exercises will be effective in improving the quality of life of patients. These exercises will reduce pain and allow patients to be more independent in their daily living activities. In the pre and post-training measurements of the current study, while there was observed to be a significant improvement in the severity of shoulder pain in the study group, this was not seen in the control group. This demonstrated that upper extremity and scapular muscle strengthening exercises reduced shoulder pain, but strengthening exercises of the upper extremity muscles alone did not provide this effect. The functional independence levels showed a significant difference compared to the pre-training values, especially in the study group. The new additions of the trunk and scapula regions to the upper extremity exercise protocol for wheelchair users after SCI can be considered to have provided positive effects on the shoulder pain, functional levels, and in parallel to these, the quality of life of the patients.

In a previous randomized controlled study, the effect was investigated of the recommendation of an exercise program and movement optimization to optimize upper extremity movement performance in people with paraplegia with SCI. The exercise and movement optimization aimed for the application of 12-week home-based shoulder strengthening and stretching exercises and information about wheelchair use techniques for transfer and raising the weight. The control group watched a 1-hour training video. Improvements in shoulder pain, muscle strength, activity, and quality of life values were observed to be better in the study group (Mulroy et al., 2011). In another study, the recommendations are given for a 12-week exercise intervention and movement optimization resulted in a decrease in shoulder pain, and this was seen to be related to improved social participation and quality of life (Kemp et al., 2011). These results in the literature support the findings of the current study. The quality of life sub-categories of psychological health and social

relationships and the total quality of life values were significantly more improved in the study group. Thus it can be said that the longer the time spent with the therapist in treatment will be effective as much as the decrease in pain and increase in functionality.

While some studies have suggested that complaints in the shoulder region have been ameliorated with exercise (Fullerton et al., 2003; Finley and Rodgers, 2004), others have reported an increase in complaints, especially fatigue. This could be attributed to overuse of the muscles in the training and muscular imbalance. Beyond this reason, it can be said that it is important to find a middle way in treatment and to apply training in such a way as to obtain maximum benefit by doing sufficient physical activity while preventing overuse of the muscles (Akbar et al., 2015; Yildirim et al., 2010). The findings of a study of 41 paraplegic subjects showed that exercises requiring eccentric muscle contractions resulted in less muscle fatigue than exercises requiring concentric muscle contractions, and these results contribute to the current study (Mayer et al., 2000). In the current study, although the study group performed additional exercises, the fact that the fatigue levels were lower demonstrates that the inclusion of large muscles in training and that some of the prescribed exercises were eccentric exercises contributed to the lower level of fatigue by the distribution of the forces. In another study, impairment of the normal work/rest cycle of the muscles was said to increase localized muscle fatigue and the risk of pain (Middaugh et al., 2013). When it is considered that the activities of wheelchair users are repeated as well as leading to overuse, it can be said that different exercises to be performed other than repeated movements and those increasing muscle endurance will contribute to the normal cycle of the muscle. Therefore, to increase resistance to the stresses which could form in the body, the exercise program selected is essential. This can play a preventative role against both cumulative injuries and secondary effects, which can occur as a result of these.

It has been emphasized in a previous study that exercise develops both mental and physical performance. However, it has also been reported that motivation is important for the performance and maintenance of exercises. The importance of starting exercises under supervision, supervised maintenance and subsequent follow-up has also been stated (Knapen et al., 2015). Therefore, to maintain the motivation of these wheelchair-bound patients who have experienced physical loss, it is important that the exercises are performed under the guidance of a therapist and that there is continued follow-up. This will reduce problems due to incorrect performance of the exercises and enable the patients to gain the ability to continue the exercises and thereby contribute to the improvement of health parameters.

There were some limitations to this study, primarily that the training and follow-periods were short as it depended on the time that the refugees stayed in the camp. In addition, taking refugee and patient psychology into consideration, the accuracy of the responses of the participants could not be proven, which could be considered another limitation. Valuation of the problems of wheelchair users with a holistic view is significant. Patients with SCI are a heterogenous group related to the differences in lesion level and comorbidities, so prevalences are low. This creates a barrier to collecting the large, homogenous samples needed for scientific research. Nevertheless, this study can be considered a reference in the establishment of evidence of the benefits and effects of exercise for SCI patients.

In conclusion, this study's results demonstrated that a 4-week therapeutic exercise program applied to individuals using a wheelchair because of SCI sustained in war had a significant positive effect on head and shoulder posture, shoulder pain, functional capacity, neck disability, and quality of life levels.

There is a need for studies to reduce pain and fatigue, increase muscle strength, functionality, and quality of life with exercise programs in individuals with disabilities who use wheelchair after SCI. Besides, it is crucial to evaluate and treat disabled patients who are victims of war in a multidisciplinary environment, help individuals adapt to social life, direct them to sports, encourage them, and reintegrate individuals with disabilities into society by increasing the opportunities to do sports.

Conflict of interests:

The authors have no conflict of interests to declare. No financial support was received for this study.

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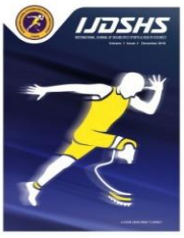

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RESEARCH ARTICLE

Comparison of Upper Extremity Physical Fitness Levels in Wheelchair Archery and Basketball Athletes

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Abstract

Purpose: The aim of this study was to investigate the relationship between upper extremity physical fitness levels of wheelchair archery and wheelchair basketball athletes. **Methods:** Ten wheelchair basketball players and ten wheelchair archers, who met the inclusion criteria were included in the study. Athletes were divided into two groups according to their sports branch. Hand grip strength, shoulder flexibility, reaction time, trunk balance and upper extremity muscle strength were measured among the upper extremity physical fitness parameters. Measurements were repeated separately for both upper extremities. In addition, the demographic data of the individuals were recorded through the questionnaire. **Results:** There was no statistically significant difference between the groups in terms of age, height, weight and body mass index ($p>0.05$). The years of disability and sports experience were significantly higher in basketball athletes, while weekly training hours were significantly higher in archery athletes ($p<0.05$). When the groups were compared, there was a statistically significant difference in right hand grip strength, trunk balance and all upper extremity muscle strength parameters in favor of wheelchair basketball athletes ($p<0.05$). There was no statistically significant difference in left hand grip strength, shoulder flexibility and reaction time of all upper extremities between the two groups ($p>0.05$). **Conclusion:** According to results, it was thought that these differences between two different sports groups are due to the different nature of the two sports branches and the fact that individuals cannot be distributed homogenously between groups according to the types of disabilities.

Keywords
Physical Fitness, Paralympic, Archery, Wheelchair, Basketball

INTRODUCTION

"The concept of disability involves individuals with long-term physical, mental, intellectual or perceptional disorders that prevent them from taking part in the society, under equal conditions with others in a complete and effective way" (Bickenbach et al., 1999). There are many sports activities that individuals with disabilities can perform with a wheelchair. Among these, wheelchair basketball is the first that comes to mind. On the other hand, wheelchair archery has become preferable more recently. Basketball, by its nature, is a fast and exciting sport requiring speed, whereas archery is more stationary and requires attention and focus, rather than speed. Wheelchair basketball is a team sport, whereas wheelchair archery can be performed both as an individual and team sport. Despite their differences, both are popular sports frequently preferred by individuals with disability (Gil-Agudo et al., 2010; Kim et al., 2018).

According to World Health Organization, physical fitness is defined as "social, mental and physical well-being" (Thompson et al., 2010).

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Some of the physical fitness parameters involve muscle strength, shoulder flexibility, body balance, reaction time etc. Due to both physical inactivity and certain physiological reasons, the level of physical fitness among individuals with disabilities is generally low. This has a negative impact on the functions of these individuals (Thompson et al., 2010).

Specific training and rehabilitation programs designed for the sports performed by individuals with disabilities have an impact on their level of success. In addition, in order to protect these individuals from secondary problems that may arise because of their disability, their level of physical fitness should also be evaluated and increased. While many studies in individuals with disabilities demonstrating the positive outcomes of performing a sport are available in the literature, whether performing a different sport will have different physical and psychological effects for the same disability level individuals are not known (Ambrose and Golightly, 2015; Barry et al., 2011; Frøsig and Richter, 2009; Loef and Walach, 2012; Uchida et al., 2012). For this reason, our study aimed to compare wheelchair basketball and wheelchair archery athletes with regard to their upper extremity physical fitness levels and examine the way different branches of sports impact individuals with physical disability.

MATERIALS AND METHODS

Participants

The study was conducted with the participation of the wheelchair basketball team's premier league athletes and paralympic archers from Istanbul Bağcılar Municipality Disability Sports Club and the paralympic archers of Istanbul Okçular Foundation Sports Club. The measurements were taken between the dates 20-29 April, 2019 at the Bağcılar Municipality's Göztepe Sports Complex and Okçular Foundation Sports Club, where the athletes attend for their regular training sessions. The participants were provided detailed information about the study and the individuals signed the written informed consent forms. The study protocol was reviewed by the local research ethics committee of Istanbul Medipol University at its meeting on March 29th, 2019 and was approved under the dossier number 10840098-604.01.01-E.12558. Ten wheelchair basketball players and ten wheelchair archers, regardless of their gender, were included in the study. Participants were required to be willing to take part in the study, literate, participating in the training sessions regularly for at least 1 year, with no history of upper extremity surgery in the last year, and with no existing mental problems preventing communication. One basketball player and one archer who suffered from an upper extremity injury and were unable to complete measurements were excluded from the study. The study was completed with the participation of 18 athletes. Participants were divided into two groups in accordance with their preferred sport activity.

Measurements

Demographics of all participants were recorded, followed by upper extremity measurement procedures. All measurements, with the exception of reaction time, were made three times for each extremity and the mean values were recorded. Hand grip strength was measured by Jamar (5030J1, Jamar, Sammons Preston, Inc, UK) hydraulic grip dynamometer. The measurements were made by using the second grip position of the device, which contains a total of five positions (Gerodimos, 2012). Shoulder flexibility was evaluated with the 'Back Scratch Test' (Dewhurst and Bampouras, 2014). Reaction time was evaluated by using the 'Nelson Visual Hand Reaction Test'. The measurements were taken for 20 times; the highest and the lowest 5 values were excluded and the mean of the remaining values were estimated (Oxendine, 1982). The strength of shoulder flexor, extensor, abductor, internal and external rotator muscles and elbow flexor muscles were measured with a Lafayette (Pelican 1150 Case, Pelican Products, Torrance, CA USA) myometer device (Livingston et al., 2015). Modified Functional Reach Test for evaluating the trunk balance was applied in 3 different versions including unilateral, bilateral and lateral reach (Magnani et al., 2017).

Statistical Analysis

Statistical analysis was performed by using the SPSS 18.0 (PASW 18, SPSS Inc, Chicago, USA) software. Data were expressed in terms of mean and standard deviation. Variables measured as numeric values were tested for normal distribution using the Shapiro-Wilks test. Since it was observed that the data were not normally distributed, statistical analysis was performed using the non-parametric Mann-Whitney U test. The statistical level of significance was accepted as $p<0.05$.

RESULTS

No significant difference was found between the groups with regard to age, height, weight and body mass index values (p>0.05), (Table 1).

Years of sports experience and years of disability were found to be significantly higher in the basketball group, whereas weekly training time was significantly higher in the archery group (p<0.05), (Table 1).

Table 1. Comparison of the demographic features of athletes

Demographic Features	Archery n=9		Basketball n=9		
	n	%	n	%	
Bilateral Ampute	0	0	3	33.3	
Unilateral Ampute	0	0	2	22.2	
Polio	0	0	2	22.2	
Paraplegia	4	44.4	2	22.2	
Tetraplegia	3	33.3	0	0	
Spina Bifida	2	22.2	0	0	
	Mean	**SD**	**Mean**	**SD**	**p**
Age (year)	30.44	4.06	34.67	7.73	0.287
Weight (kg)	71.33	11.44	74.11	12.61	0.658
Height (cm)	178.33	8.99	173.33	6.84	0.250
BMI (kg/m²)	22.48	3.23	24.68	3.87	0.289
Years of Sports Experience	4.22	4.06	14.11	5.18	**0.002***
Years of Disability	15.44	8.11	27.00	9.17	**0.030***
Weekly Training Time	28.67	8.94	8.67	1.00	**0.000***

Mann Whitney U Test, p <0.05, sd: standard deviation

When athletes were compared with regard to their hand grip strength, no statistical difference was found between the groups with regard to right hand grip strength (p>0.05), whereas a significant difference was detected in the left hand grip strength in favor of the basketball players (p<0.05), (Table 2). No significant difference was found between the groups upon the comparison of shoulder flexibility and reaction time (p>0.05), (Table 2).

Comparison of the functional reach test data between the groups revealed no significant difference for the findings of the bilateral reach test (p>0.05). However, a significant difference in favor of basketball players was observed for unilateral reach and lateral reach test findings (p<0.05), (Table 2).

Table 2. Comparison of athletes hand grip strength, shoulder flexibility, reaction time and trunk balance data

	Archery n=9		Basketball n=9		
	Mean	**SD**	**Mean**	**SD**	**p**
Hand Grip Strength	**R** 33.14	20.70	47.54	9.74	0.171
	L 28.74	21.37	48.29	8.07	**0.030***
Shoulder Flexibility	**R** 7.96	7.50	14.78	11.89	0.185
	L 13.50	14.10	16.50	9.89	0.627
Reaction Time	**R** 0.13	0.04	0.14	0.02	0.354
	L 0.19	0.14	0.14	0.03	0.791
Lateral Reach	**R** 15.91	5.50	23.16	5.87	**0.015***
	L 15.21	5.79	24.22	9.19	**0.021***
Unilateral Reach	30.77	13.18	44.81	10.71	**0.031***
Bilateral Reach	24.79	19.42	34.07	14.79	0.251

Mann Whitney U Test, p <0.05, sd: standard deviation, R: Right, L: Left

Comparison of the upper extremity muscle strength measurements revealed a statistically significant difference for all values in favor of the wheelchair basketball players. (p<0.05), (Table 3).

Table 3. Comparison of upper extremity muscle strength data of athletes

Upper Extremity Muscle Strength	Archery n=9		Basketball n=9		
	Mean	SD	Mean	SD	p
Shoulder Flexor	**R** 11.74	4.87	30.51	6.13	
	L 11.19	3.62	31.46	5.19	**0.000***
Shoulder Extensor	**R** 12.71	3.84	25.39	5.07	
	L 11.61	3.42	26.01	5.51	**0.000***
Shoulder Abductor	**R** 9.46	3.35	26.90	5.12	
	L 8.34	3.82	27.66	4.45	**0.000***
Shoulder Internal Rotator	**R** 12.06	4.50	24.57	5.59	
	L 12.48	4.46	23.13	4.00	**0.000***
Shoulder External Rotator	**R** 6.80	2.63	21.56	3.29	
	L 7.00	3.26	21.17	3.81	**0.000***
Elbow Flexor	**R** 15.01	4.61	31.84	5.40	
	L 12.89	5.78	31.83	4.53	**0.000***

Mann Whitney U Test, p <0.05, sd: standard deviation, R: Right, L: Left

DISCUSSION

Although there are various studies evaluating the physical fitness of the upper extremity in wheelchair basketball players in the literature, we could not come across any study that examining the physical fitness of the upper extremity in paralympic archery athletes. Therefore, our study was conducted in order to compare wheelchair basketball and archery athletes with regard to their upper extremity physical fitness levels.

While no difference was found between the archers and the basketball players with regard to right hand grip strength, a significant difference was observed for the left hand grip strength in favor of the basketball players. We think this difference is due to the rather low left hand grip strength of 3 athletes diagnosed with tetraplegia in the archery group. In a study by Gil et al., the dominant hand grip strength of 13 wheelchair basketball players included in the study was reported to be 44.96±9.98 kg (Gil et al., 2015). Yanci et al., reported a dominant hand grip strength of 44.50±11.33 kg for 16 wheelchair basketball players, as measured by Jamar hand dynamometer (Yanci et al., 2015). The results reported in the literature are observed to be similar to those obtained in our study (Gil et al., 2015; Wang et al., 2005; Yanci et al., 2015).

The period of time between the starting of the stimulus and the initiation of the reaction is defined as the reaction time (Gautam and Bade, 2017). In certain sports that particularly require speed, an athlete's fast response shortens the reaction time, and this in turn leads to a successful sports performance. Since basketball, by its nature, requires speed and agility, basketball players were expected to have better reaction times in comparison to archers in the study group. However, no significant difference was found between the two groups with regard to the reaction times for both hands. Wang et al., reported a simple visual reaction time of 0.19±0.02 seconds for the dominant extremities of 37 wheelchair basketball players (Wang et al., 2005). Darilgen et al., divided the study group into two, based on their classification scores and evaluated the dominant extremity's reaction time with a Newtest reaction time meter. The visual reaction time of the participants were found to be 0.20±0.02 seconds in both low and high degree trunk control groups. No significant difference was detected between the visual reaction times of the two groups (Darilgen and Yıldırım, 2008). The reaction times of the athletes in our study are consistent with those

reported in other published studies in the literature (Cömert et al., 2010; Darilgen and Yıldırım, 2008; Wang et al., 2005).

Sitting balance is defined as the ability of the individual to control movement while leaning forward without any external support. Proximal stabilization and trunk balance are highly important, particularly for ensuring the regularity of the distal movement in individuals performing wheelchair sports (Gagnon et al., 2016; Santos et al., 2014). When the trunk balance of the athletes in our study were compared, basketball players were found to have better results than the archers. Trunk muscles, such as rectus abdominus, are innervated by the nerves at the T5-T12 levels of the spinal cord. Individuals with a spinal cord injury above these levels cannot maintain their trunk balance (Adegoke, 2002). The basketball group in our study included 2 paraplegic individuals with lesions at the T5 and T7 levels, whereas the archery group included 3 tetraplegic individuals with lesions at the C7-C8 levels and 4 paraplegic athletes with lesions at the T5-T12 levels. We think the difference observed between the groups with regard to trunk balance may be both due to the higher number of individuals with spinal cord injury and the higher level of spinal cord lesions in the archery group.

In a study by Ozunlu et al., trunk balance of 69 wheelchair basketball players were evaluated with the modified functional reach test (Ozunlu and Ergun, 2012). Among the athletes with three different types of disability, unilateral and lateral reach tests revealed no statistically significant difference, whereas a significant difference was found for the bilateral reach test findings. This study differs from ours in that regard. Ozunlu et al. reported that the 3 individuals with spinal cord injury in their study had paraparesis (Ozunlu and Ergun, 2012). On the other hand, our study included individuals with tetraplegia. Therefore, we think the difference between the trunk balance findings can be attributed to the fact that athletes in the two studies had different types of disability.

Most athletes usually perform exercises aimed to develop resistance, endurance and build muscle, whereas flexibility exercises are mostly neglected. However, a flexibility program implemented correctly may provide significant benefits. Although the wheelchair archery athletes in our study had greater shoulder flexibility in comparison to the basketball players, the difference was not statistically significant. Ergun et al., divided 32 wheelchair basketball players in accordance with their years of sports experience (Ergun et al., 2008). The first group with an experience of 2.5±1.5 years had a shoulder flexibility of 13±8 cm and the second group had 4.5±4.5 years of experience with a shoulder flexibility of 18±7 cm, whereas the third group had 7.5±3 years of experience and a shoulder flexibility of 16±7 cm (Ergun et al., 2008). In this regard, this study's findings are line with those observed in our study.

When the upper extremity muscle strength measurements of the athletes were compared, a significant difference in all parameters in favor of wheelchair basketball players was found. Wheelchair archery involves drawing the bow and shooting the arrow while sitting in a stationary position in the chair. Wheelchair basketball, by comparison, involves movement patterns that require active and fast utilization of the upper extremity, such as shooting, passing and dribbling the ball and retrieving rebounds. In addition to performing these patterns, the player has to use his upper extremities actively in order to move his wheelchair continuously in the playing field. Therefore, we think the difference between the two groups is the result of the different natures of the two sports involved in the study and we believe the fact that basketball players had a higher level of sports experience also contributed to this result.

Wang et al. reported the following results for the dominant upper extremity muscle strength of 37 basketball players, as evaluated by MP DA100B BioPac force measurement system: Shoulder flexion, 25.34 kg; shoulder extension, 20.13 kg; shoulder abduction, 23.72 kg; and elbow flexion, 24.29 kg (Wang et al., 2005). Darilgen et al. used a dynamometer to measure the upper extremity muscle strength of 60 wheelchair basketball players divided into two, as low degree and high degree trunk control groups based on their classification scores. Muscle strength values of the high degree trunk control group were reported to be significantly higher than those in the low degree trunk control group (Darilgen and Yıldırım, 2008). Our findings support those reported by Wang et al. and Darilgen et al. (Darilgen and Yıldırım, 2008; Wang et al., 2005). Even though our values are similar, the fact that they are higher than those reported in the previous studies may be due to the relatively higher level of

experience of the basketball players included in our study.

The findings in our study revealed a significant difference for muscle strength in the upper extremity, grip strength and trunk balance in favor of the wheelchair basketball players. We think that the difference in the grip strength and trunk balance in favor of basketballers is due to the individuals diagnosed with tetraplegia in the archery group. Although a significant difference in favor of basketball players could be expected for the reaction time and shoulder flexibility, no differences were observed between the groups. It is surprising that there is no difference in flexibility and reaction time among the athletes of these two sports branches, one of which is reguiring speed and the other one is more stable. However this may be owing to the low number of athletes in our study. That being said, while wheelchair basketball is the most popular sport among the paralympic sport activities, paralympic archery has only started to gain popularity recently. Especially in our country, the number of disabled individuals participating in this sport is very low compared to the basketball branch. Therefore, our study includes some limitations arising from the inadequate number of individuals performing archery. In time, as more people become interested in and perform this sport, we believe the study can be repeated with a higher number of participants in the future.

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