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Journal Contact: ijdshs@gmail.com

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RESEARCH ARTICLE

The Effects of Recreational Activities on Depressive Symptoms and Burnout Level of Mothers of Children with Autism Spectrum Disorders

Eren ŞAHİN[1], Ahmet Onur ÖZ[2], R. Hürrem ÖZDURAK SINGIN[3*], and Serkan DÜZ[4]

[1-2]Institue of Health Sciences, Hitit University, Çorum, Turkey
[3]Faculty of Sport Sciences, Hitit University, Çorum, Turkey
[4]Faculty of Sport Sciences, Inonu University, Malatya, Turkey
*Corresponding author: hurremozdurak@hitit.edu.tr

Abstract

Several studies revealed some mood disorders such as depression and burnout in nursing parents as a result of difficulties brought by Autism Spectrum Disorder (ASD) symptoms. On the other hand, recreative activities have a therapeutic effect on mental health. The aim of the study was to determine the effect of physical activity-based recreation on mothers' depression and burnout levels. Fifteen mothers of children with ASD were included in the single-group pre-test and post-test experimental design study. Beck Depression Inventory and Maslach Burnout Inventory were applied to mothers to determine depression and burnout levels before and after the one-week camp. According to the results of the paired sample t-test, the depression levels of the mothers decreased significantly after the camp, whereas burnout levels remained the same. While depression and burnout levels of the mothers were moderately correlated before the recreation camp, they did not correlate following the recreation camp. It can be concluded that burnout emotional state in parents of children with ASD may correlate with depression which that might be reduced as a result of physical activity based recreative activities. Further longitudinal studies including quantitative and qualitative research methods are needed to determine the cause-effect relationship and create effective recreational programs for families of children with ASD.

Keywords
Recreation, Autism Spectrum Disorder, Burnout, Depression, Mother

INTRODUCTION

Recreation is termed as spare time and/or leisure activities to improve the quality of life of the individual (Aydın & Tütüncü, 2018). Recreation is renamed as therapeutic recreation if it serves to slows or stops the progression of any disease or in case of disability. Moreover, it contributes to the treatment process in order to increase the quality of life of the individuals and affects the psychological well-being (Aydın & Tütüncü, 2018; Tütüncü, 2012; Tütüncü & Aydın, 2016). Studies have shown that recreational activities offer benefits to individuals who feel social and psychological discomfort (Williams & Bond, 2002). There are also physical activities that are frequently involved in recreation activities. Physical activities play a role in the well-being and health of individuals and society (Demirci et al., 2018). Depression, anxiety, and burnout are the most studied and well-known mental health components affected by disability and might be lowered or even healed by recreational activities (Carruthers & Hood, 2007; Sylvester, 2014; Vella, Milligan & Bennett, 2013; Williams & Bond, 2002).

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[1]**ORCID**: 0000-0003-1701-9712, [2]**ORCID**: 0000-0001-8558-7821, [3]**ORCID**: 0000-0003-3729-5028, [4]**ORCID**: 0000-0001-7611-4838

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Autism spectrum disorder (ASD) is a neurodevelopmental disorder that has been categorized with inadequate social-communicative disorders, limited-repetitive behaviors, and limited interests (American Psychiatric Association [APA], 2013). The prevalence of ASD mostly diagnosed at early childhood has been increasing year by year. The report published by CDC (Centers for Disease Control and Prevention) indicated that 1 out of 54 children are born with the risk of ASD (Maenner et al., 2020). Several negative effects on family's psychological parameters due to the difficulties brought by the symptoms of ASD has been demonstrated in literature and became an important topic in public health research (Turnbull et al., 2007). Families often do not know how to face with and handle the difficulties and problems that has been experienced by their children with ASD. Struggling in finding solutions becomes very corrosive to the family, thus heavy load of responsibilities may lead to mental health problems such as depression, burnout, and stress (Darıca et al., 2017).

Depression is not just a spiritual breakdown, more precisely it is a mental disease that is quite complicated in terms of its causes, course, and treatment. In general, depression is a syndrome that includes symptoms such as slowness in thought, speech, and movement, stagnation, fatigue, decreased attention and concentration, decreased reluctance and motivation, lack of worthiness, guilt, pessimism, and slowing of physiological functions in a deeply sad mood (Şireli & Soykan, 2016). On the other hand, the concept of burnout was first introduced to the literature by Freudenberger in 1974. He expressed burnout as a loss of energy resulting from wearing out and overload (Freudenberger, 1974). Burnout consists of three sub-dimensions which are emotional burnout, depersonalization, and a feeling of falling in personality success.

Emotional burnout is expressed as the most critical dimension with symptoms such as lack of energy and feeling wearing out. Depersonalization is characterized as the lack of individuals' emotion, being cynical, and with disdainful behavior towards others (Kaçmaz, 2005; Leiter & Maslach, 1988; Singh et al., 1994;). Burnout can cause serious physical and mental problems in individuals. This situation paves the way for depressive symptoms. The desperate and moody mood that occurs in a depressed state affects daily life and interpersonal relationships (Çam, 1991; Dignam et al., 1986).

Families of children with ASD experience more stress and depression and lower overall family functions due to the variety of ASD symptoms (Benjak et al., 2011; Hayes & Watson 2013; Khanna et al., 2011). Weiss (2002) stated that families with children with ASD are more affected by depression, anxiety, somatic complaints, and burnout compared to other disability groups, thus parents' psychological problems are severe in ASD (Chiri & Warfield, 2012; Dabrowska & Pisula 2010; Estes et al. 2009; Sikora et al. 2013).

Krausz and Meszaros (2005) identified that being a mother of a child with ASD has a greater negative effect on the quality of life of the mother rather than fathers, since care for children is undertaken by women as a result of cultural expectations (Hastings et al. 2005; Sayer, 2005). Caring for a child with ASD with destructive behavior, anger attacks, and routine and social skills deficiencies can lead to anxiety, stress, and depression over time (Elçi, 2004; Gürbüz-Özgür, Aksu & Eser, 2017). Thus, various consequences of ASD in children may worsen mothers stress (Dabrowska & Pisula, 2010), depression (Hastings et al. 2005), and anxiety (Hastings, 2003). The higher stress and burnout level indicate that social support is needed for parents of children with ASD (Lai & Oei, 2014; Sikora et al. 2013).

The aim of the study is to determine the effect of a one-week recreation activity program (RAP) on depression and burnout levels of mothers of children with ASD. It has been hypnotized that recreational activity program may reduce (a) depression and (b) burnout in mothers of children with ASD. It is also argued that depressive symptoms and burnout levels of mothers may correlate as a result of ASD.

MATERIALS AND METHODS

The study was performed as a single group pre-test post-test experimental design with the approval of the non-interventional research ethics committee of Inonu University (No. 2020-376-03). All participants signed to a written informed consent form before the study.

Participants

Twenty-eight mothers who are members of non-governmental organizations operating for families with ASD individuals were invited to this study. The criteria sampling method was used to select the participants. Inclusion criteria of the study; (a) being healthy and volunteering to participate in the research, (b) having a child of school age (7-18 years old), (c) child is diagnosed medically as moderate and severe ASD. (d) medical diagnosis is confirmed by Gilliam Autism Rating Scale-2-Turkish Version (GARS-2-TV). GARS-2-TV is a rating scale used to assess individual behaviors specific to autistic disorder and is very strong in assessing and grading autistic symptoms of individuals with ASD (Diken et al., 2012). GARS-2-TV was applied to all children by a specialist practitioner to verify the ASD levels of children before the implementation period. Fifteen mothers met these criteria and volunteered to take part in the study. The demographic data of the participants obtained by personal information forms are presented in Table 1.

Table 1. Demographic data of the mothers of children with ASD

Variables	***Frequency (f)***	***Percent (%)***
Children, ***Age;*** $\bar{X}$***±SD: 11.7±2.7***		
7-12	10	66.7
13-18	5	33.3
Gender		
Girl	2	13.3
Boy	13	86.7
Level of ASD		
Modarate	7	46.7
Severe	8	53.3
Mothers, ***Age;*** $\bar{X}$***±SD: 39.9±5.96***		
Level of education		
Primary school	10	66.7
High school	3	20
Undergraduate	2	13.3
Income		
Low	3	20.0
Moderate	8	53.3
High	4	26.7

$\bar{X}$: Mean, *SD:* Standart Deviation

Procedure and Research Design

The camp team together with all mothers and children arrived in Kayseri Mountain Camp Center by bus. A recreation activity program started with the participation of 15 mothers and their children with ASD, 2 special education specialists and 15 volunteer students of Sports Sciences faculty. During the camp, group and individual physical exercise-based educational games and art activities such as painting, and music are applied for children with ASD. Recreative Activity Program (RAP) for mothers consists of both individual and group activities such as dancing, hiking, creative drama, physical exercise, winter sled. Pre-test and post-test were performed immediately before and after the one-week physical activity-based recreational activity program.

Data Collection Tools

Data was collected with (a) the Beck Depression Inventory (BDI) and (b) Maslach Burnout Inventory (MBI) for depression and burnout symptoms respectively at the first day and last day of the one-week RAP.

Beck Depression Inventory (BDI)

Beck Depression Inventory (BDI) was developed by Beck (1967) and adapted to Turkish by Hisli (1989). BDI contains 21 items that assess cognitive, behavioral, affective, and somatic components of depression symptoms. It consists of 21 multiple-choice items, which has four levels sorted by symptom intensity. Each item is scored on a scale of 0 to 3. BDI has high internal consistency with alpha coefficients ranging from .73 to .92 at the original form (Beck et al., 1988) and alpha coefficient of .80 at the Turkish adaptation form (Hisli, 1989).

Maslach Burnout Inventory (MBI)

The Maslach Burnout Inventory developed by Maslach & Jackson (1981) and was adapted to Turkish by Çam (1991). Duygun and Sezgin (2003) adapted to evaluate the level of burnout in mothers of children with mental disabilities (Cronbach alpha, .80). The inventory consists of 22 items. This scale is a Likert type scale and one of the options 0 to 4 is marked according to the intensity of emotion in each item.

Statistical Analysis

Statistical analysis was performed by using the IBM (SPSS for MacOS ver. 25.0, Armonk, NY: USA) statistical package program. Shapiro-Wilk test was used to check the normality of distribution. Differences in depression and burnout before and after the recreation activity camp were compared by using the Paired-sample t-Test in mothers of children with ASD. Pearson Correlation Coefficient was used to determine the relationship between depression and subgroups of burnout of mothers. The level of statistical significance was set at p<,05.

RESULTS

Descriptive statistics are given the depressive symptoms of mothers of children with ASD before and after the recreation camp are presented in Table 2 as frequency and percentage. It showed that 6.7% of mothers before RAP had severe, 73.3% had moderate, 6.7% had mild and 13.3% had minimal symptoms of depression. The program applied at the camp significantly reduced the depressive symptoms of the mothers, so that the symptoms of severe depression disappeared completely between the mothers. The moderate, mild and minimal depression symptoms were observed to change to 6.7%, 13.3%, and 80% respectively.

Table 2. Depressive symptoms of mothers of children with ASD before and after recreational activity program.

	Pre-test		**Post-test**	
Depressive symptoms	*f*	%	*f*	%
Severe	1	6.7	0	0
Moderate	11	73.3	1	6.7
Mild	1	6.7	2	13.3
Minimal	2	13.3	12	80

Table 3. Differences in depression and burnout levels of mothers of children with ASD between pretests and posttest values.

	Pre-test (n=15)	***Post-test (n=15)***	***t-test***	
	$\bar{X}$***±SD (Min-Max)***	$\bar{X}$***±SD (Min-Max)***	***T***	***p***
BDI	18.47±6.59 (4-31)	7.29±4.49 (0-18)	7.734	.001*
MBI	37.8±7.07 (20-45)	37.8±11.44 (3-52)	.001	.99

*p<.05, statistically significant difference. *BDI:* Beck Depression Inventory, *MBI:* Maslach Burnout Inventory.

Depression of mothers decreased significantly after recreational activities (p=.001, p<.05), whereas burnout remained same (p=.99, p>.05) when post-test values are compared to pre-test values (Table 3). According to Pearson Correlation Coefficient test, there was a moderate positive correlation between depression and burnout values (r=.07; p=.03) before the RAP, however, this was diminished after RAP and no significant correlation was observed in post-test values (r=.09; p=.56).

DISCUSSION

This study determined the effect of RAP on depression and burnout of mothers of children with ASD. According to the result of the present study, BDI scores showing severe and moderate depressive symptoms of mothers decreased significantly after RAP. On the other hand, MBI scores of mothers of children with ASD remained same and did not change as a result of RAP. Therefore, it can be argued that a one-week RAP might have positive effect on depression and may reduce the depressive symptoms of mothers and has a positive impact on mental health that is restricted only to depression, but not on burnout. Since the RAP was mainly based on physical activity and exercise, it can be suggested that depressive symptoms of mothers decreased significantly as a result of increased physical activity levels during the one-week RAP.

These results are supported by literature, which demonstrates that physical activity and exercise have positive effect on depression with a variety of underlying causes (Dinas et al. 2011; Patten et al., 2009). It has been stated that recreational activities based on physical exercise positively affect the psychological well-being of mothers of children with physical, mental, and emotional disabilities (Columna et al., 2011). On the other hand, burnout levels of mother remained same despite the one-week RAP. Although there are several studies indicating that recreational and physical activities have positive effect on burnout and correlate to occupational burnout intensity (Erol & Yazıcıoğlu, 2019; Toker & Biron, 2012). Studies focusing on the impact of physical exercise-based recreational activity on burnout levels in families of children with ASD or another disability are limited.

Several studies focused on burnout levels and workload of professional caregivers for the children with ASD. It was found that burnout levels of these professional employees working in the caregiving service was high and correlated with the working time (Bottini et al., 2020). In order to decrease the burnout levels, the intensity of work and care burdens need to be reduced over time, and the qualifications of the caregiver were found to be directly related to the burnout levels of the individuals (Leiter & Maslach, 2004). Taken all these findings together, it might be suggested that either the support given during RAP was insufficient in supporting families with pedagogical content to increase their qualification in care-giving to ASD in order to reduce the burnout level, or the duration of the program was not long enough to palliate the burnout (Demirtaş et al., 2019; Russell, 1987; Russell, 1990). This might also explain the difference in the correlation of BDI and MBI values of mothers before and after the one-week RAP, since only depression improved within one week whereas burnout levels remained same.

These findings are not in line with the results of the study performed by According to Tel and Ertekin-Pınar (2013), the risk of depression increases as burnout levels increase. Because, primer caregivers may experience psychological, emotional distress in the caregiving process, and these situations can lead to burnout. It can be argued that physical activity based recreation is sufficient to improve depressive disorders in mothers of children with ASD, but it is not sufficient to cope with burnout levels mostly caused by hopelessness, stress, anxiety and inconsistent relationship and cycle in the family as a result of health-related conditions of a child with ASD (Falk et al., 2014; Kim et al., 2016; Tunçel, 2017; Tunçel et al., 2018; Şahin, 2010). Another important argument might be inadequacy of measurement and evaluation of burn out levels in caregivers for individuals with disability.

The MBI was developed to measure the burn out level of individuals based on heavy workload and wearing out in daily life and therefore may not be adequate enough to measure the burn out level specific for caregivers who work for and/or have children with disabilities. Thus, heavy workload may be handled easier and solved within time, whereas concerns of families of children with disability differ in many aspects that has to be taken into consideration. Further detailed studies are needed to overcome this challenge, whereas some researchers suggested to reverse some scale items in order to eliminate this problem and increase the correctively of the assessment of burnout levels of families with MBI (Tunçel et al., 2018).

Despite the valuable findings obtained in this study, it must be taken into consideration that the burnout levels of mothers of children with ASD could not be assessed with all its subdimensions

and is, therefore, a critical limitation of this study that can be overcome in future with a new burnout inventory or scale developed for families of disabled children. Another limitation might be the absence of a control group. However, it would not be ethical to host a control group without inclusion in the activities. This limitation will be replaced in future studies with a quasi-experimental research design. Further detailed qualitative and quantitative longitudinal research is needed to develop recreation programs for both children and families in order to offer social support and social inclusion for ASD. These studies should include a high degree of recreational group activities under the supervision of specialists in the field that will also support the family in pedagogical knowledge in theory and practice.

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RESEARCH ARTICLE

Effects of Sprint and Plyometric Training on Speed, Jumping and Anaerobic Strenght of Hearing Impaired Male Sportsmen

İbrahim KURT[1], Mürsel AKDENK[2], Mehmet AKBULUT[3] and Mustafa Kemal KURT [4]

[1]Ministry of Education, Movement and Training Scientific, Researcher, Samsun-Turkey
[2]Ondokuz Mayıs University, Yaşar Doğu Sports Sciences Faculty Former Lecturer: Samsun-Turkey
[3]Turkish Disabled Persons Confederation, Ankara-Turkey
[4]II. Mehmet Anatolian High School. İstanbul, Turkey

*Corresponding author: ibrahimkurt2000@hotmail.com

Abstract

The study aims to determine the effect of a 8 week sprint and pliometric training out regularly on speed, jump and anaerobic power parameters among hearing impaired male athletes at the age of 18-21. The measurement and tests of the study was carried out in 2018 and the article was written in 2019 in Samsun. 45 male volunteers with hearing impairment participated in this study. 15 of whom are sprint training (experimental) group aged 19.6±1,18; 15 of whom are pliometrik training (experimental) group aged 19.33±1,12 and 15 of whom are control group aged 19.87±1,19. The experiment groups was made to take sprint and pliometric training practices for 8 weeks, the content of which had been determined before hand while the participants attended their trainings in their local teams. Two assessments were carried out in specified parameters for three groups at the beginning and end of the study. In statistical analysis**,** the significance level was taken as α=0,05. One way analysis of variance was used to determine the differences between the groups. When the differences were found, Tukey test was used. Paired sample t-test for within group analysis. There are not any statistically difference in parameters of age, weight and training age of the participants ($p>0.05$). There is statistically significant difference in height parameter ($p<0.05$). 8 weeks of training, at the end of the results of participants data, there are significant differences among body weight, verticalle and horizontal jumping, 20 meters and 30 meters sprint ($p<0,01$); anaerobic power, sprint group ($p<0.05$), pliometric group ($p<0,01$) positive increase. There is significant difference found in anaerobic strenght in control group ($p<0,05$). In conclusion, the results of the present study showed that both sprint and plyometric training for 8 weeks improve the sprint, jump and anaerobic power performance.

Keywords
Hearing Impaired, Sprint, Pliometric, Training, Sportsman

INTRODUCTION

In recent years, the use of scientific principles has gained great importance in increasing athlete performance. Increased knowledge about the effects of various types of training, muscle fiber types, muscle biochemistry, and nerve muscle response have enabled coaches to train a modern athlete better (Brown et al.,1986). Important developments have been made in. Studies in the field of training science have been directed towards increasing performance and increasing success (Kurudirek, 1998). In general, the efficiency of the performance athlete includes multiple (physical, physiological, biomotoric, psychological, mental, sociological, technical, tactical, etc.) components. In training, many training methods have been developed in our time and combined training systems have started to be

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[1]**ORC**ID: 0000-0001-7438-8683, [2]**ORC**ID: 0000-0002-2551-7319, [3]**ORC**ID: 0000-0002-6721-7381, [4]**ORC**ID: 0000-0002-1251-4110

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used (Kraemer, 2001). Sportive activities, especially regular activities, are important for individuals' physical development and basic skills. It is known that training increases the maximal working capacity (Fox, 1988). Physical training is useful only as long as it forces the body to adapt with high levels of loading. If the load is not enough to make a change in the body, there is no harmony in any way. These structural and physiological changes on the body are the result of the loads required by a special activity depending on the scope, intensity and frequency of training. Therefore, adaptation to training is the sum of the changes that occur with the systematic repetition of exercises (Bompa, 2003).

Plyometric training

Plyometric training provides rapid muscle activation, known as a stretching-shortening cycle. The muscles undergo an eccentric contraction before a concentric contraction. For example, an athlete jumping over the box to the floor first has an eccentric contraction in the lower limb muscles (an involuntary springing occurs depending on the falling speed when the athlete touches the ground). Then the athlete prepares to jump up again and the springing turns into a concentric contraction this time. This concentric contraction throws the athlete up and the athlete leaps over the box. To this situation; It is called the stress-shortening cycle in which eccentric and concentric contractions occur one after another. Plyometric training stands out as an effective training method with rapid results, since there are many strain-shortening cycles in the human movement (Turner & Jeffreys, 2010). As stated in the literature, there is a need for training to develop vertical and horizontal jump and leg strength training to jump faster and higher for a successful performance, especially in the sports branches based on jump. Pliometric training is recommended to improve the jumping force. Since splashes are made as explosives in a very short time unit, they develop both explosive power and explosive feature (Bosco, 1985; Chu, 1992).

Plyometric trainings and sport performance

The whole secret of plyometric training is that the muscles work the stretching-shortening cycle perfectly. At this point, we encounter scenarios related to the neurophysiological change and development of the muscles. Studies have shown that in the energy storage and flexibility of muscles (Finni et al., 2001), active working rate (Bobbert & Casius, 2005), in the nervous system (Bosco et al., 1981) show that there is an increase in pre-activity pre-preparation (McBride et al., 2008) and motor coordination skills (Bobbert & Casius, 2005). As a result of these adaptations, an increase in sportive performance is provided.

Sprint and speed training

While Gundlach defines speed as *"the ability to advance at full speed"* (Muratlı & Sevim,1977), Zaciorskij,"*The ability to complete a motoric action in a short time in an existing environment"* (Bağırgan,1982), Grosser et al. (1981), *"The ability to react as a result of a stimulus as soon as possible"* (Blair,1991; Armstrong &Simons-Morton, 1994). It is defined as "*the ability to move or move very quickly*" (Bompa (2007); "The ability of man to move himself from one place to another at the highest speed" (Sevim, 1997). Speed is the basis for performance in many sports. It is an explosive form of movement (Murphy & Wilson, 1997). Speed is the determining factor in many sports related to sprints, skips and athletics (Blair,1991;Sevim,1997). It is stated that *"speed can only be trained by being fast*" (Candan & Dündar, 1988), and training to be done for speed development should be 75-100% (Sevim,1993). It is carried out by entering a certain submaximal and maximal loadings and oxygen borrowing.

This study was conducted on hearing impaired male athletes. Although there are no studies where two different training methods are used in hearing-impaired athletes, there are studies in which different training methods are applied (Kurt et al., 2017; Kurt et al., 2018). Studies have shown that the hearing impaired is the group with the highest participation in sports among individuals with disabilities (Longmuir & Bar-Or, 2000). Sports appeals to the strong perceptions of the hearing impaired (visual, kinesthetic, etc.) and offers more understandable and feasible opportunities compared to many other areas where they struggle with difficulties because teaching methods adapted to their disabilities are not used (Mitchel, 2005).

Özsoy (1987) calls the hearing-impaired "hearing impaired" to the situation that arises because the hearing sensitivity cannot fulfill their duties in development, adaptation, especially communication, and "hearing-impaired" to those who require special education because of this self-disability. Hallahan & Kaufman (1989) defines the hearing impaired as "*a person with mild to severe*

hearing defects". Wiley (1971) states, "*For the Hearing people who have hearing sensation but who can function with or without hearing aid but who have malfunction."*
among hearing impaired male athletes at the age of 18-21.

MATERIALS AND METHODS

Participants

The measurement and tests of the study was carried out in 2018 and the article was written in 2019 in Samsun. 45 male volunteers with hearing impairment participated in this study, at the age of 18-21.

Research design in the study

Participated in the study, 15 of whom are sprint training (experimental) group aged 19.6±1,18; 15 of whom are pliometrik training (experimental) group aged 19.33±1,12 and 15 of whom are control group aged 19.87±1,19. The experiment groups was made to take sprint and pliometric training practices for 8 weeks, the content of which had been determined before hand while the participants attended their trainings in their local teams. Two assessments were carried out *basic needs of life, deaf people do not function.* ***The study aims***, to determine the effect of a 8 week sprint and pliometric training out regularly on speed, jump and anaerobic power parameters in specified parameters for three groups at the beginning and end of the study.

Data collection tools

The majority of participants are basketball players, football players and volleyball players; It was determined that they attended trainings in their clubs on average three days a week. The sprint and pliometric training groups that participated in our study performed the training specified in chart-1 for an average of 60-75 minutes 3 (three) days a week (Monday, Wednesday and Friday) with an interval of one day. At the end of the study, an educational game was played for 20-25 minutes. The work in one unit was completed in about two hours. In training, intensive interval and repetition method was applied. The intensity of his training was 75-90% (submaximal) in the intensive interval, and maximal in the repetition method (90-100%).It was applied in short intervals and different (increasing-decreasing-constant) accelerations.

Chart: 1. (A) Sprint, (B) pliometric and (C) control groups at 8-week stage, weekly trainin programs

Groups	Training Type	Loading Methods	Number of Units	Time
(A) SPRINT GROUP	Club Workouts	Technical and other works	3	90 min.
	SPRINT Workouts	With the intensive interval method and the reloading method, SPRINT TRAINING	3	60-75 min.
(B) PLYOMETRIC GROUP	Club Workouts	Technical and other works	3	90 min.
	PLYOMETRIC Workouts	Intensive interval method and With the reloading method, PLYOMETRIC TRAINING	3	60-75 min.
(C) CONTROL GROUP	Club Workouts	Technical and other works	3	60-75 min.

Warm-up

According to the characteristics of the test or training to be carried out, the participants were warmed with the same procedure for 10-15 minutes before the test and training, accompanied by the trainer. In practice, warming is completed with opening-stretching movements, each lasting 5-6 seconds, so that the physical and physiological characteristics of the athletes will affect the least

Restings

Rests, sets or series, 15 sec heart rate taken between maximal pulse between sets 90 beats / min. (full rest); 120-130 at / min in sets. (productive rest) was taken as basis. ccording to the individual loading principles, the workout continued, taking into account the athlete's own statement. Kurt et al. (2008) states that the training should be athlete-centered and the athlete should feel ready for new loads.

Weekly workouts applied to working groups in the eight-week intermediate phase:

A-Sprint Workouts

The training forms applied in this section are grouped under four (4) main headings from easy to difficult depending on whether they are with or without tools and power status:

1. Preparation and strengthening exercises (1st and 2nd week)	a)Stair studies (single-double speed running) b) Hollow sprints c) Acceleration sprints d) Acceleration sprints (positive, negative and constant acceleration:10-20-30-40-50) m.distances e) Slalom studies f) Skipping rope
2. Speed drills (3rd and 4th week)	a) Jumping-exaggerated running b) Stipping the knees to the abdomen - on-site and running forward c) Slalon operation (3-4x 10) among towers (10 pieces) d) Slalom study (3-4-5x15) between funnels (15) e) Landing works (for speed barrier) (incline not more than 15 degrees)
3.Drawing drills and acceleration sprints (5th and 6th week)	a) Hill climbing (on different slopes) 30-40 meters) b) Hill climbing (on different slopes) 50-60 meters) c) Fartlek works (500-750-1000 meters; Vd.), d) Changing direction, running at different speeds.
4. Submaximal and maximal sprint training (7th and 8th weeks)	a) Pramidal Sprint (incremental) load training, (10-20-30-40-50 m. (4-6 again) Submaximal (75-90) intensity, b) Pramidal Sprint (incremental) Loading Workouts, (10-20-30-40-50 m. (4-6 repeat) at maximal (90-100) severity, etc. c) Interval sprints: (20-30-40-50-60-70) m. (4-6 reps). Submaximal (75-90%). d) Interval sprints: (20-30-40-50-60-70) m. (4-6 reps). Maximal (90-100%).

B-Pliometric Workouts

The training forms applied in this section are grouped under four (4) main headings from easy to difficult depending on whether they are with or without tools and power status:

Weineck (1988) suggests that depth jumps should be done last, after other studies have been done, and the following steps for jumping studies:

1	Depth Jump Exercises
2	Additional Weight Jumping Exercises
3	Leg Force Exercises With Barbell Or / Dumb-Bell
4	Additional Weightless Jump-Force Exercises

Stages of the bounce force level (Weineck, cited from 1988:Dundar, 1994; adaptation: Kurt, 2011)

1. Preparation and strengthening studies (1st and 2nd week)	a) Skipping rope (in various ranges and numbers) b) High knee drills c) Stair work d d) Jumping tense knees to abdomen e) Leap-overrun running f) Stipping the knees on the abdomen (on-site and forward) g) Hoping run h) Double foot jumping (using arms-arms encede-arms with hips)
2. Jumping and power movements depending on the movement performed (3rd and 4th week)	a) Leaping out of potty posture b) squating stretched splash c) Jumping from the taking-push-up state to the potty state d) Jumping from flat tumble to potty state e) Frog splashes f) Double foot jump using arms. Hexagonal work g) Commando movement (dance)
3-Jumps on the 2nd Tool (driller) (5th and 6th week)	a) Jumping exercises between lines drawn on the ground b) Jumping exercises on the rope ladder on the ground (single foot and doubl feet), etc. c) Gymnastic order or jumping from low obstacle (single-double foot) d) Jumps to the side (Hands, free; waist; neck) e) Kangaroo leaps (odd-even); frog leaps f) Change lateral-direction, jump over low-middle obstacle (Hands, in differer position) g) Jumping exercises over a single medicine ball (10-15-20 repetitions) h) On intermittent health balls (10 pieces: 3-5-7 rebound exercises

4. Barrier and vault drills (7 and 8 weeks)	a) Jumps over barriers (by changing forward and direction) b) Changing direction through the funnel and jumping c) 180 degree rotation funnel jumps f) Gymnastic Box Serial jumps over the body part g) Jumps over different (long-short) barriers h) Depth leap through Gymnastic Boxes the crates (double feet); Increasing-decreasing heights in crates. i) Depth leap through Gymnastic Boxes increasing and decreasing heights (double feet).

Measurements and tests

Participants' age, training age, body weight, height length, vertical jump height, horizontal jump length, 20 meters basic speed, 30 meters sprint speed tests and anaerobic power calculations were made. Measurements, tests and training, accompanied by a sign language translator and three researcher trainers, one of whom is recording, on the synthetic track and artificial turf field, outdoors, at a temperature of 18-20 C^0, with an altitude of 759 mm-Hg at 10 altitudes, in the same environment and applied under conditions.

Age and training age determination

Identity cards are taken as the basis for determining the chronological age of the athletes. For the training age, the number of years active licensed sports is based.

Body weight and height length measurement

Body weight was measured in kilograms with a pressure sensitive to 100 grams. In practice, athletes with bare feet, shorts and t-shirts on the soles of the feet were flat on the scales and measurements were taken. The height measurements were also measured with the same arrangement, such as the body height of the subject from the heels to the top of the head. The subjects' feet are closed, the head is upright, the knees are stretched, the heels are adjacent, the body is in an upright position, it is provided to reach high paint by taking a deep breath. The distance between the miter and the floor from the vertex point is recorded in centimeters.

Vertical and horizontal jump test

Leap is a capability that contains an index of complex movements. Bounce depends on the strength of the leg muscles, the explosive force, the flexibility of the muscles involved in the jump and the technique of jumping (Mülhfriedal, 1987;Sevim,1997).From this point of view, increasing the jump force provides high efficiency especially in sports such as football, volleyball and basketball (Ziyagil,1989; Chu,1992). *Jumping force,* is defined as the jump of the athlete vertically high and horizontally away (Günay et al., 1994). The development of horizontal and vertical jump forces show atypical similarity (Muratlı & Sevim, 1977).

Vertical jump (VJ) test

Several studies in recent years show that anaerobic exercises have a positive effect on vertical jump. In practice, with the help of the jumpmeter connected to the waist of the athlete, the distance shown on the electronic meter is recorded, provided that the two feet are actively jumping upwards and falling to the same place. Of the two (2) valid leaps, the best was evaluated.

Horizontal jump (HJ) test

The subject tries to jump long distance from behind the marked line by using maximal effort with double feet. The distance between the starting line and the nearest trail left by the athlete to the line is measured in meters (Fetz & Konoxl, 1978). In practice, the athlete stands behind a straight line drawn on the ground on the synthetic track, with the toes behind the line double feet. Feet are in the normal range. The subjects were informed that by using all their forces forward with the help of the arms with the knees bent, they had to make a hard move to leap forward and away horizontally and they should be placed on the ground as they were without losing their balance. As a result of the two pairs of feet horizontally jumped from the standing position, the distance between the line at the jump point and the last trace of the subject was measured in meters of steel tape, and the best of the two valid jumps was evaluated.

20-meter and 30-meter acceleration test

Significant improvement in acceleration can be procured by practical technique, proper training, and coordination development despite having innate specialties (Günay & Yüce, 1996). Bağırgan (1982) states that a certain level of velocity is necessary, even this level can vary, for each branch of the sport to succeed. To detect the basic velocity level, a 20-meter acceleration test has been applied as the indicator of the particular velocity and a 30-meter acceleration test has been applied to detect sprint velocity. A new test brand photocell was used in the application. The athlete takes the high starting behind two meters of the start line and waits as the sign language translator gave the ready command (rising and waving white flag). He runs at his finest whenever he starts the parkour. Timing starts as the athlete entered the start point and it stops itself after the end of the 20-meter and 30-meter measured separately. The distance between the start and endpoints on the synthetic track was measured with an accuracy of 0.01. The best of the two measurements taken at 10 minutes intervals at both distances were taken.

Calculation of anaerobic power

Anaerobic power is work power that can be generated in one minute anaerobic way, using the ATP-CP energy source. Anaerobic power will be high in excess of the ability to use the ATP-CP energy source. Anaerobic energy sources; Adenosine Triphosphate (ATP) is Creatine Phosphate (CP) and Glycogen. In an oxygen-free environment, the energy necessary for muscle contraction is released by their metabolic breakdown. ATP and CP are called energy-rich phosphagen. These are emergency energy sources. Although they are limited in our muscles, their energy potential is high, that is, they can create high energy in a short time. These energy sources are used in short-term, high-intensity efforts (Akgün, 1992).

Although there is no satisfactory method that can measure anaerobic power with the desired accuracy (Manning et al.,1988) , there are tests and indirect methods that partially reflect anaerobic power (Foss et al.,1998). Anaerobic strength tests are routinely used in exercise physiology laboratories. Most of these tests are standing vertical jumping, standing horizontal jumping, Margaria-Kalamen, and Wingate test (Mayhew et al.,1986). In our study, anaerobic power was calculated with the following formula by taking the bodyweight with the vertical jump height determined as a result of the vertical jump test (Garnbetta, 1989; Tamer, 1995).

P (Anaerobic Power) = $\sqrt{4.9}$ x (W) x $\sqrt{D}$
calculated with the formula. These values:
P=Anaerobic Power (kg.m/sec.)
W=Body weight (kilogram),
4.9 =Standard time (seconds),
D=Distance jumped vertically (meter).

Statistical analysis

In statistical analysis, the significance level was taken as α=0,05. One way analysis of variance (One-Way ANOVA) was used to determine the differences between the groups. When the differences were found, Tukey's HSD **(**Tukey's Honestly Significant Difference) test was used. Paired sample t-test for within group analysis.

RESULTS

A difference has been found on the height parameter by comparing the parameters of subjects' ages, height, boy mass, and training ages with one way variance analysis ($p<0.05$) (Table 1). In the comparison done by Turkey's HSD test, the height of the sprint group was found out different(shorter) than other plyometric groups and control group,($p<0.05$) (**Table 2**). After the two measurements gauged both before and after the eight-week-long sprint and plyometric training program applied to the hearing impaired 18-21-year-old boy athletes. Positive effects have occurred in the factors of body mass, vertical jump, horizontal jump, twenty and thirty meters acceleration, and anaerobic power of both groups ($p<0.01$). No difference was found in other parameters except for increasing in anaerobic power ($p<0,05$)depending on the meaningful gain on the body mass of the control group, ($p>0,05$). (**Table 3-a,b,c**).

Table 1. Comparison of participants' age, height, body weight, and training age parameters and one-way analysis of variance (One Way ANOVA) test results

Parameters	(A) Sprint Training Group (n=15)			(B)Pliometric Training Group (n=15)			(C) Control Group (n=15)			F	P
	Mean-Sd.	Min	Max	Mean- Sd.	Min	Max	Mean – Sd.	Min	Max		
Age (years)	19.6±1,18	18	21	19.33 ±1,12	18	21	19.87 ±1,19	18	21	0.847	p>0.05
Height (cm)	178.13±4,85	166	184	179.93±7,26	173	188	179.53±5,88	165	187	7.464	P<0.05*
Weight (kg)	68.95±5,60	60.1	76.2	71.42±10,1	55.4	92.2	70.40±13,12	42.1	94,1	0.227	p>0.05
Training age (years)	4.27± 1,53	2	7	4,4 ± 1,82	2	7	4.47 ± 1,98	2	7	0.049	P>0.05

As a result of one-way analysis of variance (One Way ANOVA) test of the participating groups; Age: (F=19.47=0.847;p>0.05); body weight: (F=19.47=0.227; p>0.05); training age: (F=19.47=0.049; p>0.05), there is no significant difference between parameters. height: (F=3.23=7.464; p<0.05) and height parameters were found different (Table 1).

Table 2. Comparison of the participants' height parameters Tukey HSD test table

Groups	$\lvert X_1-X_2\rvert$	T		Decision (p)
Sprint - Pliometric	| 178,13 - 179.93 |	=1.8	> 1.19	p<0.05*
Sprint - Control	| 178,13 - 179.53 |	=1.4	> 1.19	p<0.05*
Pliometric - Control	| 179.93 - 179.53 |	=0.4	< 1.19	p>0.05

As a result of the Tukey method; While there was no significant difference between the height of the plyometric training group and the control group, (p>0.05); the lengths of these two groups were found to be significantly longer than those of the sprint training group. (p<0.05), (Table 2).

Results of (A) Sprint Training, (B) Pliometric Training and (C) Control Groups's pre test / post test Data Paired (Dependent) "T" Test in Various Parametrs:

Table 3-a) (A) Pre / post test data of the Sprint training group in various parameters paired (dependent) "t" test table

	Parameters	Tests	(A) Sprint Training Group (n=15) Mean- Sd.	Mean-D .	t	P
1	Body weight (kg)	Pre-test Post-test	68.95±5.6 67.15±5.31	-1.8	14.02	p<0.01*
2	Verticalle jumping (cm)	Pre-test Post-test	51.8±9.34 54.2±24.13	2.4	5,67	p<0.01*
3	Horizontal jumping (cm)	Pre-test Post-test	219.53±25.31 225.33±21.5	5.8	12,61	p<0,01*
4	20 Meters sprint (sec.)	Pre-test Post-test	3.18±0.25 3.07±0.19	-0.11	5,9	p<0.01*
5	30 Meters sprint (sec.)	Pre-test Post-test	4.578±0.34 4.417±0.19	1.161	8,19	p<0,01*
6	Anaerobic power (kg.m/sec.)	Pre-test Post-test	109.588±15.85 110.589±15.82	0.999	2,96	p<0,01*

(*) (A) In the sprint training group, in the measurements made after 8 weeks; subjects' body weight (t=14.02;p<0.01), vertical jump (t=5.67;<0.01), horizontal jump (t=12.61;p<0.01), 20 meters accerelation (t=5.9;p<0.01), 30 meters accerelation(t=8.19;p<0.01), anaerobic power, (t=2.96;p<0.05), statistically significant difference (development) was found in all parameters (Table 3-a).

Table 3-b) (B) Pre / post test data of the pliometric training group in various parameters paired (dependent) "t" test table

Parameters		Tests	(B) Pliometric Training Group (n=15) Mean- Sd.	Mean-D	t	P
1	Body weight (kg)	Pre-test	71.42±10.09			
		Post-test	70.16±9.91	-1.26	5,78	p<0.01*
2	Verticalle jumping (cm)	Pre-test	52.6±9.39			
		Post-test	56.4±9.09	3.8	12,83	p<0.01*
3	Horizontal jumping (cm)	Pre-test	214.6±19.77			
		Post-test	221.93±18.86	7.33	16.14	p<0.01*
4	20 Meters sprint (sec.)	Pre-test	3.226±30			
		Post-test	3.156±0.26	-0.07	8,28	p<0.01*
5	30 Meters sprint (sec.)	Pre-test	4.49±0.27			
		Post-test	4.396±0.24	-0.094	7,16	p<0.01*
6	Anaerobic power (kg.m/sec.)	Pre-test	114.432±20.47			
		Post-test	116.408±19.38	1.976	3,11	p<0.01*

(*)

(B) In the Pliometric training group, in the measurements made after 8 weeks; subjects' body weight (t =5.78;p<0.01), vertical jump (t =12.83; p<0.01), horizontal jump (t =16.14;p<0.01), 20 meters speed (t=8,28; p<0.01), 30 meters sprint speed (t=7.16; p<0.01), anaerobic power (t=3.11; p<0.01), statistically significant difference (development) was found in all parameters (Table 3-b).

Let us examine the control group's data to understand whether the developments in the two training groups are the result of the training practices or the routine training in the clubs:

Table 3-c) (C) Pre / post test data of the control group in various parameters paired (dependent) "t" test table

Parameters		Tests	(C) Control Group (n=15) Mean- Sd.	Mean-D	t	P
1	Body weight (kg)	Pre-test	70.39±13.12			
		Post-test	70.67±12.47	0.28	2.33	p<0.05*
2	Verticalle jumping (cm)	Pre-test	53.07±10.28			
		Post-test	53.0±9.55	-0.07	0,34	p> 0.05
3	Horizontal jumping (cm)	Pre-test	220.2±21.54			
		Post-test	220.66±19.58	0.46	1.48	p> 0.05
4	20 Meters sprint (sec.)	Pre-test	3.113±0.16			
		Post-test	3.123±0.15	0.01	1,83	p> 0.05
5	30 Meters sprint (sec.)	Pre-test	4.48±0.2			
		Post-test	4.469±0.19	0.01	1,58	p> 0.05
6	Anaerobic power (kg.m/sec)	Pre-test	113.194±23.57			
		Post-test	113.928±16.45	0.734	*2,64*	p<0.05*

(*)(C) In the control group, in the measurements made after 8 weeks; subjects' body mass (t=2.33;p<0.05 *), vertical jump height (t=0.34; p>0.05), horizontal jump length (t=1.48; p>0.05), 20 meters basic acceration (t=1.83;p>0.05), 30 meters sprint acceration (t=1.58; p> 0.05), Anaerobic power, (t=2.64;p<0.05*). Statistically, there is a significant difference in body weight and anaerobic power parameters. No significant difference was found in other parameters. The increase in body weight of the control group may be due to seasonal training reduction. We can say that the increase in anaerobic power is due to the increase in body weight because it produces more anaerobic power (Table: 3-c).

It can be seen in these data that the exercises applied to the sprint and plyometric group caused a decrease in body weight of the subjects, development in vertical jump and horizontal jump, development in 20-meter speed and 30 m sprint speeds, and increase in their anaerobic power (**Table 3-a-b**).

DISCUSSION

Some researches seek out the effect of certain types of training on certain parameters. Plyometric exercises are quite common among them: (Günay et al., 1994; Cicioğlu et al.,1997; Kutlu et al., 2001; Luebbers et al., 2003; Kurt, 2011; Kurt et al., 2013; Pamuk & Özkaya, 2017). On the other hand, there are different kinds of plyometric exercise to compare with a different method: Quick power and plyometric exercises (Öztin et al., 2003). Sprint and plyometric exercises (Markovic et al., 2007) et al. There are some researches too that seek out the effect of different kinds training on several parameters: Quick power (Sevim & Erol,1993; Sevim et al.,1996;Polat et al., 2002; Kurt et al., 2010b), strength (Eler & Sevim, 2002), quick power and sprint (Diallo et al.,2001; Polat et al., 2002), intensive interval exercise (Son et al., 2007), enduring and interval exercises (Revan et al., 2008), aerobic and interval exercise (Kurt et al., 2017) et al.

Body mass rate of subjects

The arithmetic mean of the pre-measurement rate of the sprint exercising group is 68.95 kg. The lowest rate was calculated as 60.1 kg while the highest rate was calculated as 76.7 kg. The arithmetic mean of the last measurement is 67.15 kg. The lowest rate was calculated as 59.04 kg while the highest rate was calculated as 74.5 kg. The difference between the first and the last measurement is 1,8 kg which equals to≅%2.61. The arithmetic mean of the pre-measurement rate of the plyometric exercising group is 71.42 kg. The lowest rate was calculated as 55.04 kg while the highest rate was calculated as 92.2 kg. The arithmetic mean of the last measurement is 70.16 kg. The lowest rate was calculated as 54.01 kg while the highest rate was calculated as 89.8 kg. The difference between the first and the last measurement is 1,26 kg which equals to≅%1.76. The arithmetic mean of the pre-measurement rate of the control group is 70. 393 kg. The lowest rate was calculated as 42.1 kg while the highest rate was calculated as 94.1kg. The arithmetic mean of the last measurement is 70.67 kg. The lowest rate was calculated as 43.3 kg while the highest rate was calculated as 92.4 kg. The difference between the first and the last measurement is 0.28 kg which equals to≅%0.32.

In this experiment, in the term of body mass 1.8 kg of wane has occurred in sprint exercising group and it sounds meaningful ($p<0.01$); 1.26 kg of wane has occurred in the plyometric exercising group and it sounds meaningful ($p<0.01$). 0.28 kg of rising has occurred in the control group and it sounds meaningful ($p<0.05$). It is thought that the meaningful decrease in body mass is due to the effect of applied sprint and plyometric exercises on the decrease in body weight. The results obtained in our study show parallelism with the previous study results in body weight.

Some literature studies about body mass

Kurt et al. (2017) meaningful wane in body mass and other parameters as a result of the 8 week-long research which search the effect of aerobic and interval training on anaerobic power, velocity and jumping performance of hearing-impaired basketball players ($p<0,01$). Thirty-two subjects from the age of 15 between 19 were subdivided in to experiment group (n=16) and control group (n=16). Kurt et al. (2015), meaningful wane in body mass of experiment group as a result of the 8 week-long research aimed to find out the effect of training done by stretch and shortening cycle muscle exercising on some physical and physiological parameters of the soccer player, sixteen of who were subdivided as the control group while the other sixteen were subdivided as experiment group ($p<0,01$). Kurt (2011) meaningful wane in body mass in the experiment group as a result of the 8 week-long research which is held by thirty-two soccer players from the age of 15 and 16 ($p<0.01$). Ateş et al. (2007), meaningful wane in body mass of the experiment group as a result of ten-week plyometric training applied to football players aged 16-18 ($p<0.05$). Koç (2010), As a result of the combined training program applied to handball players, they found a decrease in the body mass of the subjects. Berger et al. (2006), Compared to the control group which is applied continuous and high-intensity interval training performed 3-4 days a week for six weeks, it was stated that no significant change was observed in any of the

groups and the changes in both training groups were similar in the term of body mass.

Vertical jump rate of the subjects

The arithmetic mean of the pre-measurement rate of the sprint exercising group is, 51.8 cm.The lowest rate was calculated as 33 cm. while the highest rate was calculated as 69 cm. The arithmetic mean of the last measurement is 54.2 cm. The lowest rate was calculated as 38 cm, while the highest rate was calculated as 70 cm. The difference between the first and the last measurement is 2.4 cm. which equals to 4.63%. The arithmetic mean of the pre-measurement rate of the plyometric exercising group is 52.6 cm. The lowest rate was calculated as 38 cm. while the highest rate was calculated as 73 cm. The arithmetic mean of the last measurement is 56.4 cm. The lowest rate was calculated as 41 cm,while the highest rate was calculated as 76 cm.The difference between the first and the last measurement is 3.8 cm. which equals to7.22%. The arithmetic mean of the pre-measurement rate of the control group is, 53.07 cm.The lowest rate was calculated as 36 cm. while the highest rate was calculated as 72 cm.The arithmetic mean of the last measurement is 53.0 cm. The lowest rate was calculated as 35 cm. while the highest rate was calculated as 70 cm.The difference between the first and the last measurement is 0.07cm. which equals to 0.13%.

Accordingly, in the vertical jump test, in the sprint training group, 2.4 cm. improvement and significant ($p<0.01$); in pliometric training group 3.8 cm. improvement was found and significant ($p<0.01$). In the control group, there was an improvement of 0.07 cm and it was not found significant ($p>0.05$). In the vertical jump, more improvement occurred in the pliometric training group compared to the sprint training group. At vertical jump, significant improvement is thought to be due to the training effect of sprint and pliometric exercises applied to the vertical jump. The results obtained in our study were in line with the previous study results on vertical jump.

Some literature studies about vertical jump

Adıgüzel & Günay (2015), In the study, in which 30 male basketball players participated in the study which they were investigated the effect of eight-week piliometric training on the jump and isokinetic force parameters in 15-18 age group basketball players, in addition to the training program, free jump in vertical jump with some other parameters as a result of pliometric training three days a week for eight weeks (cm), 120° squat jump (cm) and active jump (cm) values significant improvement ($p<0.05$) Kurt & Taşkıran (2004) meaningful development in both groups in vertical and horizontal jump as a result of 12-week pliometric training in their studies, which divided the athletes into two groups according to their anaerobic power. Öztin et al. (2003), meaningful improvement in vertical jump as a result of the eight-week quick strength and pliometric training program applied to 15-16 year old basketball players ($p<0.01$); Luebbers et al.(2003) meaningful improvement in the vertical jump values of the subjects as a result of four-week pliometric training. Kutlu et al. (2001), In this study, which was conducted to investigate the effect of plyometric training on the anaerobic power of young football players, the subjects were divided into three groups as 17 football players participating in the plyometric exercise program, 17 football players who continued their normal training and 17 students in the sedentary control group, and in this study, meaning development in the vertical jump in the experimental group ($p<0.01$); Al-Ahmad (1990), They determined that there was a meaningful improvement in vertical jump values at the end of the six-week plyometric training with 14-18 age group basketball players.

Horizontal jump rate of the subjects

The arithmetic mean of the pre-measurement rate of the sprint exercising group is, 219.53'cm.The lowest rate was calculated as 183 cm. while the highest rate was calculated as 254 cm. The arithmetic mean of the last measurement is 225.33 cm. The lowest rate was calculated as 191 cm., while the highest rate was calculated as 261 cm. The difference between the first and the last measurement is 5.8 cm. which equals to 2.64%. The arithmetic mean of the pre-measurement rate of the plyometric exercising group is 214.6 cm. The lowest rate was calculated as 176 cm. while the highest rate was calculated as 243 cm. The arithmetic mean of the last measurement is 221.93 cm. The lowest rate was calculated as 185 cm, while the highest rate was calculated as 248 cm.The difference between the first and the last measurement is 7.33 cm. which equals to 3.42 %. The arithmetic mean of the pre-measurement rate of the control group is, 220.2 cm.The lowest rate was calculated as 176 cm.

while the highest rate was calculated as 272 cm.The arithmetic mean of the last measurement is 220.66 cm. The lowest rate was calculated as 180 cm. while the highest rate was calculated as 267 cm. The difference between the first and the last measurement is 0.46 cm. which equals to 0.21 %.

Accordingly, in the horizontal jump test, in the sprint training group, 5.8 cm. improvement and significant ($p<0.01$); in pliometric training group 7.33 cm. improvement was found and significant ($p<0.01$). In the control group, there was an improvement of 0.46 cm and it was not found significant ($p>0.05$). In the horizontal jump, more improvement occurred in the pliometric training group compared to the sprint training group. At horizontal jump, significant improvement is thought to be due to the training effect of sprint and pliometric exercises applied to the horizontal jump. The results obtained in our study were in line with the previous study results on horizontal jump.

Some literature studies about horizontal jump

Kurt et al.(2016), meaningful improvement in the horizontal jump variables of the experimental group as a result of the ten-week study in which they studied the impact of anaerobic training together with basketball training, in a study they conducted on 28 hearing-impaired male basketball players studying at a special education vocational high school ($p<0,01$); Kurt et al. (2013),In the study, in which 32 soccer player aged 15-16 participated who were divided into two groups as an experiment (n=16) and control (n=16), meaningful improvement in horizontal jump parameters was detected in the eight-week modified training and stretch and shortening cycle exercising; Markovic et al. (2007), As a result of their studies investigating the effects of sprint and stretch and shortening cycle exercising on muscle function and athletic performance, they found a meaningful improvement in the horizontal jump values of sprint and plyometric training groups. Cicioğlu et al. (1997), as a result of the plyometric training applied to 14-15 years old boy basketball player; Öztin et al. (2003), as a result of the eight-week-long plyometric and quick power applied to male basketball player aged 15-16 ($p<0.01$). Günay et al. (1994) as a result of plyometric training exercised by 19-25 years old top-tier athletes, the meaningful improvements were recorded on vertical jump value. Gamar (1987), As a result of the eight-week study that allocated the subjects as a weight training group, plyometric training group, and control group, 11.2 cm for the weight training group, 9.5 cm for the plyometric group and 5.0 cm for the control group were determined.

20 meter speed rate of the subjects

The arithmetic mean of the pre-measurement rate of the sprint exercising group is, 3.1806'sec..The lowest rate was calculated as 2.94 sec. while the highest rate was calculated as 3.76 sec. The arithmetic mean of the last measurement is 3.0666 sec. The lowest rate was calculated as 2.84 sec., while the highest rate was calculated as 3.51 sec. The difference between the first and the last measurement is 0.114 sec.. which equals to 3.58 %. The arithmetic mean of the pre-measurement rate of the plyometric exercising group is 3.226 sec. The lowest rate was calculated as 2.81 sec. while the highest rate was calculated as 3.76 sec. The arithmetic mean of the last measurement is 3.156 sec. The lowest rate was calculated as 2.78 sec, while the highest rate was calculated as 3.78 sec. The difference between the first and the last measurement is 0.07 sec. which equals to 2.17 %. The arithmetic mean of the pre-measurement rate of the control group is, 3.113 sec. The lowest rate was calculated as 2.81 sec. while the highest rate was calculated as 3.42 sec. The arithmetic mean of the last measurement is 3.123 sec. The lowest rate was calculated as 2.85 sec. while the highest rate was calculated as 3.45 sec. The difference between the first and the last measurement is 0.01sec. which equals to 0.32 %.

Accordingly in the 20 meter speed test, in the sprint training group, 0.114 sec. improvement and significant ($p<0.01$); in the pliometric training group, 0.07 sec. improvement was found and significant ($p<0.01$). In the control group, there was an improvement of 0.01 sec. and it was not found significant ($p>0.05$). In the 20 meters speed, more improvement occurred in the sprint training group compared to the pliometric training group. At 20 meters speed, significant improvement is thought to be due to the training effect of sprint and pliometric exercises applied to the 20 meters speed. The results obtained in our study were in line with the previous study results on 20 meters of speed.

Some literature studies about 20 meters speed

Kurt et al. (2017), the subjects with hearing impairment in which they practiced aerobic and interval training programs were divided into experiment (n=16) and control (n=16). In the study, positive development in 20 meter speed variable ($p<0.05$); Pamuk & Özkaya (2017) investigated the effect of pliometric and resistant pliometric training applied to 15-17 year-old boys basketball players on sprint and agility performance, and in the 12-week study of 35 male basketball players who participated in regular training, they made a 3-meter run time improvement ($p<0.05$); Kurt et al. (2010a), eight-week elongation-shortening cycle applied by the experimental group in the study where the 15-16-year-old male footballers studied the effect of the training program performed with the length-shortening-cycle muscle study and separated the subjects as experiment (16) and control (16). As a result of training, significant improvement in 20 meter speed test ($p<0.01$); Markovic et al. (2007), as a result of their studies investigating the effects of sprint and pliometric training on muscle function and athletic performance, they found a significant improvement in sprint and pliometric training groups at 20 meter speed.

30 meter speed rate of the subjects

The arithmetic mean of the pre-measurement rate of the sprint exercising group is, 4.578 sec..The lowest rate was calculated as 4.12 sec. while the highest rate was calculated as 5.19 sec. The arithmetic mean of the last measurement is 4.4173 sec. The lowest rate was calculated as 4.08 sec., while the highest rate was calculated as 4.88 sec. The difference between the first and the last measurement is 0.1607 sec.. which equals to 3.51 %. The arithmetic mean of the pre-measurement rate of the plyometric exercising group is 4.578 sec. The lowest rate was calculated as 4.18 sec. while the highest rate was calculated as 5.12 sec. The arithmetic mean of the last measurement is 4.396 sec. The lowest rate was calculated as 4.14 sec, while the highest rate was calculated as 5.04 sec. The difference between the first and the last measurement is 0.182 sec. which equals to 3.98 %. The arithmetic mean of the pre-measurement rate of the control group is, 4.48 sec.The lowest rate was calculated as 4.15 sec. while the highest rate was calculated as 4.15 sec. The arithmetic mean of the last measurement is 4.469 sec. The lowest rate was calculated as 4.20 sec. while the highest rate was calculated as 4.79 sec. The difference between the first and the last measurement is 0.011 sec. which equals to 0.25 %.

Accordingly in the 30 meter speed test, in the sprint training group, 0.1607 sec. improvement and significant ($p<0.01$); in the pliometric training group, 0.182 sec. improvement was found and significant ($p<0.01$); In the control group, there was an improvement of 0.011 sec. and it was not found significant ($p>0.05$). In the 30 meters speed, more improvement occurred in the sprint training group compared to the pliometric training group. At 30 meters speed, significant improvement is thought to be due to the training effect of sprint and pliometric exercises applied to the 30 meters speed. The results obtained in our study were in line with the previous study results on 30 meters of speed.

Some literature studies on sprint speed of 30 meters

Kurt et al. (2010b), the eight-week study conducted by the experimental group in their studies, where they investigated the effect of rapid force station studies on the sprint speed of 30 meters and 60 meters of young athletes aged 15-18, separated the subjects as experimental group (n=10) and control group (n=10). significant improvement in 30 and 60 meters values as a result of rapid strength training ($p<0.01$); Ateş et al. (2007), 10 week pliometric training applied to 16-18 age players, significant improvement in the 30-meter speed values of the experimental group ($p<0.01$); Son et al. (2007), 30 players in the 15-16 age group participated in the study, meaningful improvement over 30 meters as a result of intensive interval training sessions applied to 15 male players for eight weeks ($p<0.05$); Öztin et al. (2003), a significant improvement in 30-meter speed ($p<0.01$) as a result of eight-week quick strength and pliometric training applied to 15-16 year old boys basketball players; Polat et al. (2002), a significant improvement in 30-meter sprint values ($p<0.01$) in the study where they investigated the effect of rapid strength training on some physical parameters and 30-meter sprint values; Eler & Sevim (2002) investigated the effect of handball-specific strength training on some performance parameters of young male handball players, development of experimental groups at 30 meter speed ($p<0.01$); Diallo et al (2001) improves the sprint values of 20, 30 and 40

meters as a result of the exercise applied to children aged 10-12 3 days a week; as a result of eight-week rapid-strength station studies; Sevim & Erol (1993) found a significant improvement ($p<0.01$) in 30-meter sprint values after eight weeks of rapid strength training.

Anaerobic power rate of subjects

The arithmetic mean of the pre-measurement rate of the sprint exercising group is 109.588' kg.m/sec. The lowest rate was calculated as 77.95 kg.m/sec. while the highest rate was calculated as 135.99 kg.m/sec. The arithmetic mean of the last measurement is 110.589 kg.m/sec. The lowest rate was calculated as 81.46 kg.m/sec. while the highest rate was calculated as 139.46 kg.m/sec. The difference between the first and the last measurement is 1.001 kg.m/sec. which equals to 0.91≅%. The arithmetic mean of the pre-measurement rate of the plyometric exercising group is 114.432 kg.m/sec. The lowest rate was calculated as 90.78kg.m/sec. while the highest rate was calculated as 159.40 kg.m/sec. The arithmetic mean of the last measurement is 116.408 kg.m/sec. The lowest rate was calculated as 93.90 kg.m/sec. while the highest rate was calculated as 159.92 kg.m/sec. The difference between the first and the last measurement is 1.976 kg.m/sec. which equals to 1.73≅%. The arithmetic mean of the pre-measurement rate of the control group is 113.194 kg.m/sec. The lowest rate was calculated as 61.110 kg.m/sec. while the highest rate was calculated as 146.70 kg.m/sec. The arithmetic mean of the last measurement is 113.928 kg.m/sec. The lowest rate was calculated as 63.58 kg.m/sec. while the highest rate was calculated as 145.199 kg.m/sec. The difference between the first and the last measurement is 0.734 kg.m/sec. which equals to 0.65 ≅%.

Accordingly, 1,001 kg.m /sec in anaerobic power, sprint training group. improvement and significant ($p<0.05$); In the pliometric training group, 1.976 (kg.m/sec.) there was improvement and it was found significant ($p<0.01$). In the control group, an improvement of 0.734 kg.m/s was found and found significant ($p<.05$). There was more improvement in anaerobic power in the pliometric training group than in the sprint training group. Significant improvement in anaerobic power is thought to be due to the training effect of sprint and pliometric exercises applied to improve anaerobic power. The increase in the control group is thought to be due to the increase in the body weight of the subjects. The results obtained in our study were in line with the previous study results on anaerobic power.

Some literature studies on anaerobic power

Kurt et al. (2018), in the studies in which 28 male basketball players with hearing impairment participated, in the studies in which subjects were divided into experimental (n=14) and control (n=14), significant improvement in the anaerobic power after the 10-week anaerobic training applied by the experimental group ($p<0.05$); Kurt et al. (2017), in the study of male basketball players with hearing impairment, in which they applied aerobic and interval training programs, the subjects were divided into experimental (n=16) and control (n=16), significant improvement in the anaerobic power variable ($p<0.05$); Son et al. (2007), in the study of 30 male players aged 15-16 years, significant improvement in the anaerobic power of the experimental group as a result of the intensive interval training applied to 15 soccer players for eight weeks ($p<0.05$); Ateş et al. (2007), the development of the anaerobic power of the experimental group, along with some other parameters, as a result of the ten-week pliometric training they applied to football players aged 16-18, ($p<0.01$); Öztin et al. (2003), the improvement of anaerobic power values ($p<0.01$) as a result of eight weeks of rapid strength and pliometric training applied to 15-16 year old boys basketball players; Kutlu et al. (2001), as a result of their study to investigate the effect of pliometric training on the anaerobic power of young footballers, significant improvement in the anaerobic power of the experimental group ($p<0.01$); Cicioğlu et al. (1997), in the study in which they investigated the effects of pliometric training on 14-15 age group basketball players, significant improvement in anaerobic power values ($p<0.01$); Günay et al. (1994), as a result of their pliometric training with senior athletes between the ages of 19-25, found a significant improvement ($p<0.05$) in their anaerobic power values.

Conclusion

Sprint and pliometric training in different protocols applied to hearing-impaired athletes for 8 weeks apart from club work caused positive differences in the speed, jump and anaerobic power variables of the athletes. However, sprint workouts showed more improvement in speed

parameters, while pliometric workouts showed more improvement in jump and anaerobic power parameters. There was no significant difference in the variables of the control group. The difference between the three groups participating in the study in the direction of sprint and pliometric training groups is thought to be due to the training effectiveness of sprint and pliometric exercises to improve the performance in related parameters. As a result, sprint and pliometric training programs applied to hearing-impaired athletes between the ages of 18-21 have positive effects on the body weight, vertical jump, horizontal jump, 20 and 30 meter speed and anaerobic power variables; When applied correctly and methodically, it can be said that it can be used as an effective and useful training method.

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RESEARCH ARTICLE

Investigation of The Pain and Disability Situation of The Individuals Working "Home-Office" At Home At The Covid-19 Isolation Process

Nihan Ozunlu Pekyavaş[1] and Engin Pekyavaş[2]

[1] Baskent University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Turkey
[2]Special Statistical Consultancy, Turkey
*Corresponding author: nozunlu@baskent.edu.tr

Abstract

The aim of our study is to examine pain and disability in low back, knee and shoulder regions of individuals working at home during COVID-19 isolation process. In our study, 87 volunteers were included in digital media by questionnaire with data collection method. Individuals who worked in the office before COVID-19 isolation but started working from home during the isolation were included in our study. In addition to the socio-demographic characteristics of the individuals, their situation about the working environment at home was questioned. In addition, pain in the low back, knee and shoulder regions was evaluated with an 11-point pain scale (EPPS). In order to determine the level of disability, individuals were asked to fill in the Oswestry Disability Index (for the lumbar region), Lysholm Knee Score (for the knee region) and the Disability of Arm, Shoulder and Hand Questionnaire (DASH) (for the shoulder region). It was seen that 86.2% preferred desk environment more frequently as home working environment and 65.5% spent 3 to 8 hours in this environment. During the home isolation process, the highest pain was observed for low back pain (50.6%) in individuals (EPPS:4-5), then shoulder pain (44.8%) (EPPS:5) and knee pain (35.6%) (EPPS:4-5). When the levels of disability were evaluated, the Oswestry score was found 13.08±11.98, the Lysholm score was found 91.20±12.23 and the DASH score was found 9.61±16.78. It has been observed that individuals working at home during COVID-19 isolation process may develop shoulder and knee pain, and mostly in the low back region, and all these pain are defined as moderate severity pain. However, when we look at the levels of disability, it was seen that low back pain, knee pain or shoulder pain did not pose a significant problem in the life of the patient and the level of disability was low.

Keywords
Pain, Low back, Shoulder, Knee, Covid-19 isolation process

INTRODUCTION

During the COVID-19 isolation process, many office workers started to continue their daily working life at home, as well as in the world. This work system, called "Home-Office", caused a decrease in physical activity in individuals as well as isolation. "Home-Office" work is a form of practice that is rapidly becoming widespread for both developed and developing countries, which enables individuals to work from home depending on the employer or to adapt their homes to economic activity through their own initiatives (Karakoyun, 2016).

Although this way of working is seen as a cost-effective way of working, protecting the health of the individual becomes an important factor. In addition to ergonomic arrangements such as adequate lighting and ventilation, an important factor for physiotherapists is to ensure that the individual's working ergonomics is maintained (Elison, 2011; Carayon & Smith, 2000; Harrington & Walker, 2004). If the ergonomic arrangements provided in the workplace are not fully achieved in the working position, the individual may expect to

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[1]**ORCID**: 0000-0003-0603-5688, [2]**ORCID**: 0000-0002-6902-7469
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develop pain and disability in various regions due to working in the same position for a long time. According to the studies, a positive relationship was found between various neck problems and work-related risk factors such as static neck and arm postures, sitting time and workplace design. Among other job characteristics, high quantitative job demands, having little effect on one's job status and limited rest breaks were found to be determinants of neck pain (Eriksen et al.,1999; Ariens et al., 2001; Shannon et al., 2001).

It should also be taken into consideration that working conditions at home may not be similar to offices, ergonomic working conditions can not be met, and therefore, pain may arise in individuals in various regions. For this reason, the purpose of our planned study is to examine the pain and disability in the low back, knee and shoulder regions of individuals working at home during the isolation process.

MATERIALS AND METHODS

The study protocol was approved by the University Ethics Committee and written consent was obtained from all participants of the study. In our study, 87 volunteers were included in the digital platform by questionnaire with data collection method. Individuals between the ages of 18-50 who worked at the office for at least 6-8 hours a day at the office before the COVID-19 isolation process, but started working from home during the isolation were included in our study. In addition to the socio-demographic characteristics of the individuals, their characteristics of home working environments (the environment they work in, the average duration of stay in this environment per day, the device used actively) were questioned.

Pain Assessment: Pain intensity in the waist, knee, and shoulder regions of the participants was evaluated with an 11-point pain scale (EPPS). Individuals were asked to make markings considering their pain at rest. In EPPS, which is a Likert type scale with values between 0-10, it was stated as "0 = I have no pain, 10 = I have unbearably pain". The results were interpreted by a specialist physiotherapist (Kwong & Pathak, 2007).

Determining Disability Levels: In order to determine the level of disability, individuals were asked to fill in the Oswestry Disability Index (for the lumbar region), Lysholm Knee Scoring Scale (for the knee region) and Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH) (for the shoulder region).

• ***Oswestry Disability Index*****:** Oswestry Disability Index was calculated over 50 points. The options in each question were scored between 0-5. The total score was calculated by summing up the scores of the answers given to all questions.

According to the results;

0% to 20% - Low back pain is not a major problem in the patient's life

20% to 40% - Low back pain slightly restricts the patient's daily life

40% to 60% - Low back pain severely restricts the patient's daily life

60% to 80% low back pain, the patient's daily life is completely restricted

80% to 100% - Bed-dependent patient (or symptoms are exaggerated)

The results were interpreted by a specialist physiotherapist (Fairbank et al., 1980; Fritz & Irrgang, 2001).

• ***Lysholm Knee Score:*** The Lysholm Knee Score consists of 8 parameters, each scored differently. The total score is 100. The sum of the scores of the answers marked by the individual was recorded as the score of the individual. The results were interpreted by a specialist physiotherapist (Collins et al, 2011).

• ***Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH):*** The survey includes a 30-item disability / symptom scale: function (21 items), symptom severity (six items) and psychological factors (three items); and two optional scales: business (four items) and sports / performing arts (four items). The individual marked the appropriate answer according to the 5-point Likert system. Results were obtained between 0-100. The results were interpreted by a specialist physiotherapist (Düger et al., 2006).

Statistical Analysis: According to the sample size analysis, a total of 87 individuals were needed for 80% power and 5% type 1 error. The power analysis of our study was determined by considering the level of disability as the primary outcome. The data obtained from the participants were analyzed using the statistics program (SPSS) version 20.0 prepared for social sciences (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.). The data were presented in the tables and graphs using percentages and mean as the central

distribution criterion and standard deviation as the spread criterion. Confidence interval was accepted as 95%.

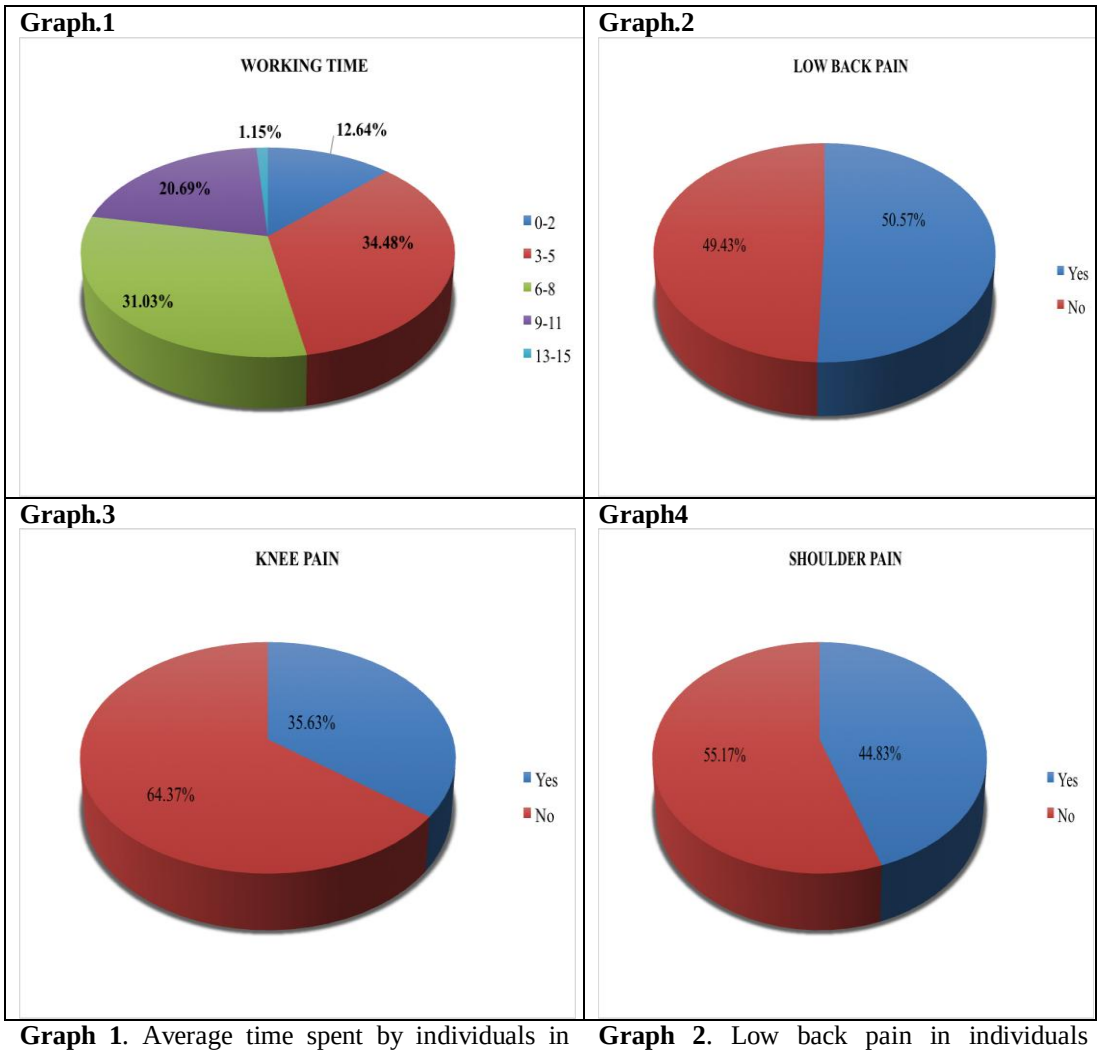
RESULTS

The mean age of 87 individuals (59.8% male, 40.2% female) participating in our study was 38.18 ± 7.56 years, and the average body mass index was 26.05 ± 4.69 kg / m^2. It was seen that 86.2% preferred desk environment more frequently as home working environment and 65.5% spent 3 to 8 hours in this environment (Graph 1).

It was observed that there was no low back, shoulder or knee pain before the isolation process at home. During the home isolation process, the highest pain intensity was observed for back pain (50.6%) (EPPS: 4-5) (Graph 2), then shoulder pain (44.8%) (EPPS: 5) (Graph 4) and knee pain (35.6%) (EPPS: 4-5) (Graph 3) in participants. When the levels of disability were evaluated, the Oswestry score was found 13.08 ± 11.98, the Lysholm score was found 91.20 ± 12.23 and the DASH score was found 9.61 ± 16.78 in home-office working.

Considering the most seen pain symptoms of participants classified by working hours, it was seen that;

- Knee pain in 0-2 hours (%63,6),
- Low back pain 3-5 hours (%56,6),
- Shoulder pain 6-8 hours (%66,6),
- Low back pain 9-11 hours (%50),
- Low back pain 13-15 hours (%50)



Graph 1. Average time spent by individuals in working environment

Graph 2. Low back pain in individuals during the isolation process at home

Graph 3. Knee pain in individuals during the isolation process at home

Graph 4. Shoulder pain in individuals during the isolation process at home

DISCUSSION

In this study, we aimed to examine the pain and disability conditions in the low back, knee and shoulder regions of individuals working at home during the COVID-19 isolation process and found that pain may occur in especially low back region more than knee and shoulder in individuals working at home, and all these pain may develop in moderate severity. Despite this, when we look at the levels of disability, it was seen that low back pain, knee pain or shoulder pain do not pose a significant problem in individuals' lives and their disability levels are found low.

Computer use in non-neutral postures such as neck rotation and shoulder abduction has been identified as risk factors for neck-shoulder symptoms (Tittiranonda, Burastero & Rempel, 1999). Postural stress caused by poor workstation ergonomics, such as the inappropriate position of the screen, keyboard or mouse, has been associated with musculoskeletal problems (Demure et al., 2000). In our study, especially the low back, knee and shoulder regions that we think can be left under postural stress are chosen during working at home. With the working at home process, it was observed that individuals worked at the desk in the same position for high hours. However, it was observed that there was moderate pain revealed in each region evaluated due to postural stress. However, it has been observed that disability levels of individuals are not affected due to this pain. This is thought to be due to the fact that the posture created at home, together with the release of pain, may not have caused serious injury.

Low back region is though to be one of the most negatively affected areas in long term sitting during work hours. Although this situation, the extensive recent epidemiological literature does not support the popular opinion that sitting-while-at-work is associated with low back pain (Hartvigsen et al., 2000; Roffey et al., 2010). Neck, back, shoulder and knee/thigh areas are also found to be the highest discomfort prevalence rates ranging from 35% to 60%, and about 90% of the discomfort was related to bus-driving in bus drivers who are also working in prolonged sitting position (Szeto & Lam, 2007). In our study, we have seen that pain may occur in especially low back region more than knee and shoulder in individuals working at home, and all these pains may develop in moderate severity which did not pose a significant problem in individuals' lives and their disability levels are found low.

According to a study, the influence of the home office is found to appear to be mostly positive and the influence of traditional office mostly negative on aspects of both work and personal/life which includes work/life balance and personal/family success (Hill, Ferris & Martinson, 2003). Another possible reason for our study results might depend on this situation, which would affect the pain perception in participants. Working from home might have caused the participants to have less pain although there are improper working conditions as we all are biopsychosocial beings.

We thought that the individuals who were working in the office before the COVID-19 isolation process and started to work at home with the isolation process, would have developed pain and disability more in the low back, knee and shoulder regions due to the lack of ergonomic working order and a decrease in long-term physical activity. However, the results of our study show us that it does not pose a significant problem in individuals' lives. Considering the limitations of our study, we think that the inclusion of other regions, such as the neck, which may be affected by the posture, can provide different information about the level of pain and disability of individuals during the work at home. Also identifying the previous physical activity levels and working postures may be more informative about the subjects.

Conflict of interest: The authors declare no conflict of interest. No financial support was received.

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RESEARCH ARTICLE

Analysis of Researches on Individuals with Special Needs and Their Academic Successes

Aytekin Hamdi BAŞKAN[1], Ayşenur Oral[2], Fırat DEMİROĞLU [3] and Gözde KELEŞ [4]

[1]Giresun Üniversity, Department of coaching education, Giresun, Turkey
[2,3,4]Giresun Üniversity, Health Sciences Institute, Giresun, Turkey
*Corresponding author: aytekinbaskan@gmail.com

Abstract

The aim of this study is to examine the researches on the academic achievement of individuals with special needs in 2018-2019 and in the fields of science. It is reported that the number of the individuals with special needs in the world and Turkey is increasing day by day. It is known that there are difficulties in academic learning according to the type and level of special needs of people with special needs. The mainstreaming approach, which is accepted as the continuation of general education schools with their peers, provided that individuals with special needs receive special education services to support their education, has been widely adopted in many countries for the past thirty years. For the children who have special needs, inclusive education is really important to keep up with the society. The aim of co-education is to meet the social and emotional needs of students with special needs by integrating them academically and socially with their peers. In this study, the data archive of the Google trend search engine in 2018-2019 was used as a method for the comparative study of individuals with special needs and academic success, which are research topics. According to the research, it is found that the rate of research or people who have special needs is quite high compared to the academic success and it's observed when we consider all these issues between the cities people with special needs have been researched in nearly provinces of Turkey. Moreover, it is found that although the rates were quite high, the success wasn't and the number of searches are higher in Ankara and İstanbul than other provinces.

Keywords
Individuals with Special Requirement, Disabled, Academic Successes

INTRODUCTION

It is reported that the number of the individuals with special needs in the world and Turkey is increasing day by day (Cengiz et al., 2016). The special need is defined as the need for protection, care, rehabilitation, counseling and support services that have difficulties in adapting to social life and meeting daily needs, due to the loss of physical, mental, spiritual, sensory and social abilities of various degrees from birth or for any reason (İnan et al., 2013).

The participation and acceptance of children in need of special education, like normal children, depends on their ability to perform many skills in daily life. The ability to fulfill these skills, to have a profession later in life and to live independently has a close relationship with the education given in pre-primary, other education levels and the quality of this education. It is wrong to expect the children with special needs in the classrooms of the schools that provide general education to normal

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[1]**ORC**ID: 0000-0003-4204-7408, [2]**ORC**ID: 0000-0002-8267-0555, [3]**ORC**ID: 0000-0003-0771-7162, [4]**ORC**ID: 0000-0002-6361-921X

developing children to learn the skills and procedures at the same level, and therefore to adapt the child with special needs to the schedule states that it will be against the basic principles of special education (Sinoplu, 2009).

Many studies have been conducted on the problems and ways they have in academic learning according to the type and level of special needs of people with special needs(Cengiz et al., 2016; Çevik, 2016; Okur & Demir, 2019). Mental disability which is one of the developmental retardation, is the situation where the individual's mental functions and meaningful limitations and inadequacies are observed in the conceptual, social and practical adaptability skills (Fidan & Akyol, 2011). Individuals with special needs can be educated and taught within themselves depending on the degree of exposure to the special need. Individuals with special needs can be trained and taught within themselves depending on the degree of exposure to the special need (Çevik, 2016). The mainstreaming approach, which is accepted as the fact that individuals with mild special needs benefit from special education services in addition to their academic education, with their peers in general education institutions, has been widely used for the last thirty years, as a result of this, in many countries, students with special needs are educated in general education schools together with their normally developing pers (Sucuoğlu & Özokçu, 2005). Mainstreaming education is important for children with special needs to adapt to society. The aim of cooperative education is to provide the social and emotional needs of students with disabilities by integrating them academically and socially with their peers (Biçer & Sarı, 2017).

There are different types of special needs students in learning environments. According to the types of special needs, learning difficulties related to the courses in the schedule in which the individual is studying are revealed. It is thought that 80-85% of the information obtained while learning is through vision (Okur & Demir, 2019). Learning is thought to be more effective since the use of materials and materials that support education activates more than one sense organ. These systems as called sense organs provide vision, hearing, touch, taste, and smell. In the lack of any of the sense organs, there may be deficiencies or inabilities in learning (Zorluoğlu & Sözbilir, 2017).

It is an obvious fact that people with special needs have more difficulties in academic learning than their peers with normal development. Additional materials and sources should be provided according to the special needs type for each individual with special needs in teaching however, we know that the great majority of learning happens through vision therefore, it was observed that individuals with special needs of vision had more difficulty in academic learning compared to other special needs (Zorluoğlu & Sözbilir, 2017; Okur & Demir, 2019).

MATERIALS AND METHODS

In this study, a documentary research method based on data obtained from the web, archive, library and similar sources about the research problem has been applied. Search engines are software and websites that aim to give the fastest and most accurate results to the search queries made by users, where the sites on the internet are recorded and archived according to content such as articles, videos, files, images, etc. Google search engine is a mechanism used to search the content on the internet. The word trend means way, tendency and leaning. Based on the Turkish word of the trend, Google Trend (https://trends.Google.com/) can be described as a tool that shows Google or trends or search trends in other ways. In general, trends help measure the level of interest in search terms.

On the "Google trends" site, only the change of a group in relation to a variable over time can be explored, as well as a comparison of the trends of different groups in the same variable. The following variables are likely to be used to identify trends or trends. The following variables are likely to be used to identify trends or tendency.

Geographical restriction

It seems possible to limit the search worldwide and across countries. In this study, the worldwide and Turkey limitation was used.

Time limitation

There are time, day, month, year limitation options. In this study, 2018-2019 years were used in comparisons.

Category limitation

In this section, many categories are offered from shopping to science, finance to health and sports, with the option of all categories. In this study, only science option was used.

Search group limitation

In this section, Google web search, image search, Google news search, Google shopping and Youtube search options are presented. In this study, Google scholar and Google trend method are applied.

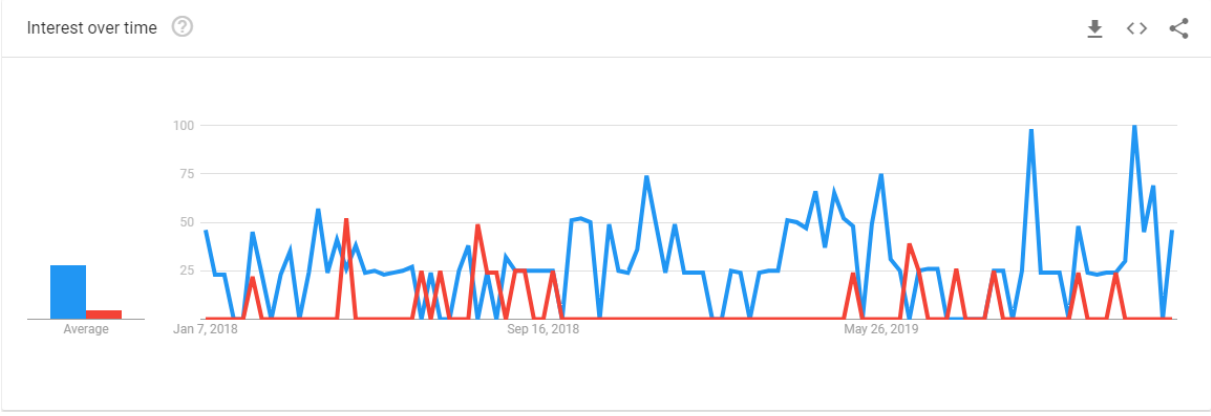
The values and numbers presented in trends

Show interest in a relative search with the highest point in the graphic for a specific region and time. The value of 100 indicates the highest popularity of the period. Also, the value of 50 means half as popular. Similarly, a value of 0 is shown to be less than 1% of the top popularity of interest for a relative search.

RESULTS

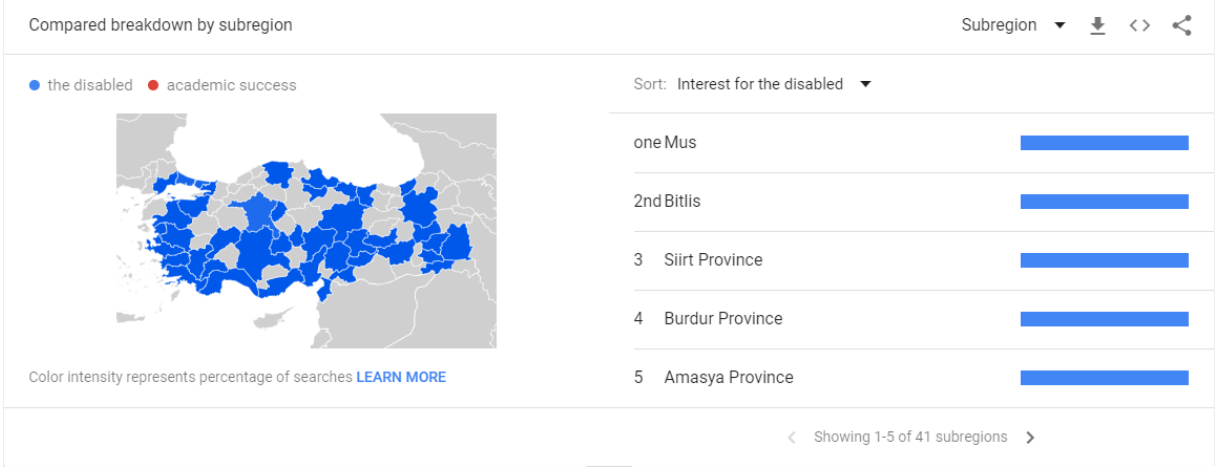
The results of this study are presented in tables in a comparative way of the searches made at "https://trends.google.com".

Table 1. A comparison of the rate of special needs individuals and searched on the internet between 2018- 2019 academic term success in the science category in Turkey



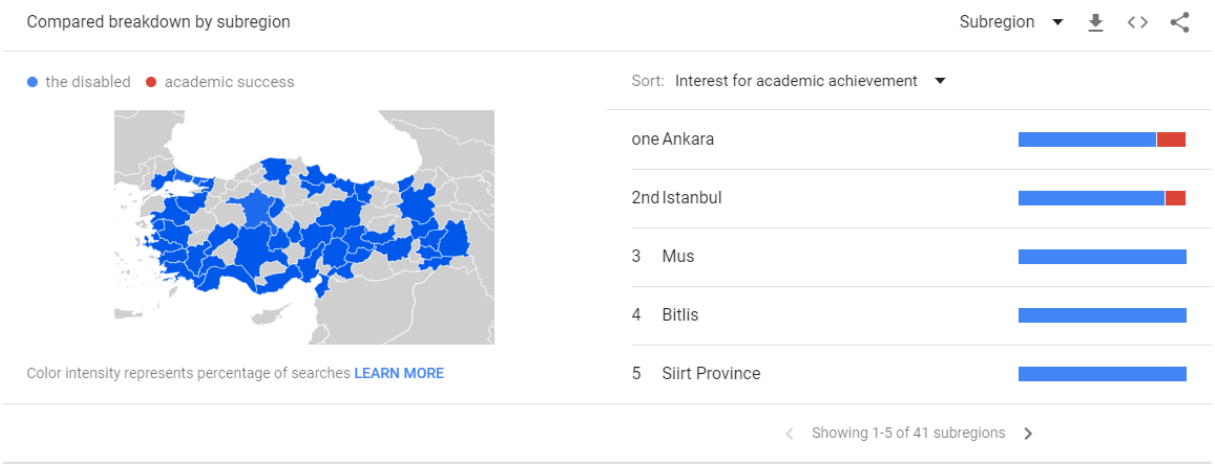
In Table 1, a line chart comparing the rates of search on the web in the science category between 2018 and 2019 of the terms of individual with special needs and academic success in Turkey was examined, and it was found that the rate of research of the tern of “individual with special needs” was generally higher than the rate of research of the term of “academic success”.

Table 2. Comparison of inter-city internet search rates between 2018-2019 for individuals with special needs in the science category throughout Turkey



According to the data contained in Table 2, between 2018 and 2019 in Turkey, the search rate for the term of “ individual with special needs” in the science category is 100% between the dates specified in 39 of the 41 sub-regions included in the scope of the study when comparing on a provincial basis.

Table 3. The comparison between cities of the internet search rates between the years 2018-2019 in terms of academic achievement in the science category across Turkey



In Table 3, data comparing the provincial-based search rates of the term of "academic achievement" in the science category between 2018 and 2019 in Turkey are examined and 39 of the 41 sub-regions included in the scope of the research do not have search data, while the remaining only 2 regions have a search rate of 16% in Ankara and 14% in Istanbul.

DISCUSSION

In this article, the subjects of "individuals with special needs" and "academic achievements of individuals with special needs" were investigated. In line with the data obtained as a result of the research, as explained in Table 1, it was observed that the rate of researching the term of "individuals with special needs" was higher than the term of "academic achievement of individuals with special needs". In Table 2, the rate of research of the term of a person with special needs is determined and explained by taking the criteria of 41 sub-regions (provinces) located in Turkey. The fact that this term has been researched in many provinces of Turkey in the search results suggests that information has been obtained to raise the living standards of individuals with special needs and it can be concluded that the increase in searches, not only in large cities, but also in many provinces from east to West, strengthens this assumption, helping to increase the awareness of individuals with special needs in society. According to the data obtained from Table 3, it was seen that the term of "academic achievement of individuals with special needs" was the subject of research in only 2 of the 41 sub-regions mentioned above and this situation, showing more sensitivity to the subjects such as socialization of individuals with special needs, their integration into the society and as a result of their daily life, makes us think that their academic success is not the same subject of research. Consideration of the future with this assumption, the study on improving the academic achievement of individuals with special needs are expected to only raise awareness in almost every province of Turkey in particular are not metropolitan. However, there is a point to consider that not every disability occurs as a result of the same type of inadequacy. While some types of disabilities are caused by physical disabilities, some types of disabilities are caused by mental disabilities. Therefore, the work to be done for each type of disability, the strategy to be followed and the method to be applied differ. There are many studies in the literature that support the study in this respect. For example, the information that graphic symbols are frequently used for teaching reading-writing is included in the literature, and it is emphasized that especially individuals with special education needs tend to define graphic symbols more easily than written words. (Koul et al., 2005) (Trudeau et al., 2007) In a different study, (Yılmaz, 2009) stated that the physiotherapy method used in teaching writing to mentally disabled students in the first year of primary education has positive effects on children's writing skills. For the hearing impairment, which is a different type of disability, (Satılmış, 2010) stated that the active learning method is much more effective than the traditional teaching method on

the achievement of the hearing impaired students in geography lesson. In (Tezcan, 2012) Tezcan's thesis in 2012, he asked students with mild intellectual disabilities to learn science and mathematics knowledge effectively, which can be useful in their daily lives and help them solve problems more easily, using information technologies and as a result, it increased the academic success of the students and the level of permanence in their learning. In another study whose type of disability was hearing, it was stated that the method of using graphic symbols in learning environments on individuals with disabilities and receiving positive feedback and this method enriched the classroom environment and had a facilitating effect in the learning process. (Karal et al., 2014) Based on the studies that support the subject in chronological order, it can be said that the correct studies and the variation of effective methods applied to increase the academic activities and success of individuals with special needs have increased over the years and the positive feedback obtained as a result of this can lead to new studies that can be made.

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RESEARCH ARTICLE

Investigation of The Continuity of Training and Mental Health of Athletes During Social Isolation In The Covid-19 Outbreak

Pınar Kaya CİDDİ[1] and Elif Aleyna YAZGAN[2]

[1]Istanbul Medipol University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, İstanbul / Turkey
[2]Istanbul Medipol University, Institute of Health Sciences, Physiotherapy and Rehabilitation Department, İstanbul / Turkey

*Corresponding author: pkaya@medipol.edu.tr

Abstract

Purpose: Social distance and isolation measures have been taken to minimize the spread rate of COVİD-19 and within these measures, all sports leaques and toumaments have been suspended or canceled. In this study, it is aimed to investigate the training continuity and mental health of athletes during the COVİD-19 isolation process and to determine whether they are physically and mentally ready for the next season competition. **Methods**: 89 athletes, 17.7±2.72 years old, belonging to different sports branches were included in the study. The training time and mental health of athletes before and after isolation were questioned through the online questionnaire platform. Generalized Anxiety Disorder-7 (GAD-7) and Epidemiologycal Research Center Depression Scale (CES-D) were applied to assess the mental status. Participants were asked questions about their thoughts on sports performances and grouped according to their answers and their anxiety and depression levels were compared. **Results**: It was observed that most of the athletes had a decrease in the training time compared to before isolation. CES-D scores of athletes who thought that their sports performance decreased during the isolation process and were not ready to return to the matches were higher than athletes who did not think ($p<0.01$). GAD-7 and CES-D scores of athletes who were worried about the competitions were higher than other athletes (($p<0.01$). **Conclusion**: The results showed that athletes needed physical and psychological support by sports professionals, both during the isolation process and before returning to sports competitions.

Keywords
Athletes, COVİD-19, Mental Health, Social İsolation, Training

INTRODUCTION

COVID-19 is one of the major pathogens targeting the human respiratory system, and the most common symptoms of its infection are fever, cough, chest tightness and shortness of breath (Bogoch et al., 2020, Wang et al., 2020). Due to the lack of preventive and therapeutic medical interventions for its treatment, it has a rapid transmission rate and the number of infected is rapidly increasing (Crisafulli & Pagliaro, 2020).

Social distancing and isolation measures are taken to minimize the rate of COVID-19's spread. Being isolated at home to prevent social interaction and the spread of the disease is among these measures (Paçenha et al., 2020). One of the other measures taken is to suspend or cancel all sports leagues and tournaments between mid-March 2020 and early June 2020 (Escher, 2020). All teams anticipated that their athletes 'health could be negatively affected and stated that the protection of their athletes' health is a priority issue

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[1]**ORCID**: 0000-0002-7611-0527, [2]**ORCID**: 0000-0003-1364-1811
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and that their athletes should stay at home as part of compulsory home isolation by following government rules (Jukic et al., 2020).

While sports competitions continue, athletes can maintain their physical fitness and sports performance in the best way, but it is thought that the lack of sports competitions and training during the isolation process will create many problems for teams and athletes (Pillay et al., 2019). During isolation, not only the physical performance of the athletes, but also their mental health is negatively affected due to the lack of competition (Hughes et al., 2019, Sarto et al., 2020). Mental health is inseparable from physical health, and problems in mental health increase the risk of physical injury and delay recovery (Reardon et al., 2019). In the light of this information, our study aimed to investigate the continuity of exercise and psychosocial influence of athletes in our country during the isolation period when there were global pandemic and public health restrictions. In this study, it is aimed to investigate the training continuity and mental health of athletes during the COVID-19 isolation process, to determine whether they are physically and mentally ready for the next season competitions, and to make a preliminary assessment to prepare the necessary support programs.

MATERIALS AND METHODS

Participants

In order to be able to participate in the study, the participants had to be doing individual or team sports licensed and their sports competitions had to be canceled or suspended. Participants were included in the study via online survey software (Google Surveys) and social media communication (WhatsApp). As a result of the literature review, the total sample size was found to be n = 89 using the G-Power program with 0.30 effect size, 95% power and 0.05 margin of error based on the percentage measurement values for the methods to be studied. 160 participants started the online survey, 71 responses were missing and were therefore excluded from the data set. The sample of 89 athletes obtained was included in the study. The study was evaluated by the Istanbul Medipol University Non-Invasive Research Ethics Committee and was approved with the number 10840098-604.01.01-E.15843 (Decision number: 452).

Measurements

The athletes answered questions using online survey software (Google surveys) in the period corresponding to the beginning of May 2020 during the strictest public health restrictions in Istanbul (After March 10, the date when the coronavirus detected the first cases in Turkey, solid public health restrictions began on March 27). The questionnaire consisted of three parts, where demographic information was obtained, the level of depression was evaluated, and the anxiety level was evaluated.

Demographic characteristics included information on age, gender, body mass index (BMI), presence of chronic disease, and sports branch. In this section, the types and frequencies of training performed before and during isolation were asked. In addition, it was questioned whether he received support for his training program during the isolation process, from whom and in what way he received support, whether he experienced any problems or pain while training, and if so, from whom he received help.

Participants were asked whether their sports performance decreased, whether they felt ready for competitions, whether they would need a psychological support program before returning to competitions, and whether they were concerned about a decrease in their sports performance after recovery in case of COVID-19 infection. While answering these questions, they were asked to mark one of the 'yes / no' options.

Depression levels of the participants were evaluated with the Center for Epidemiologic Studies Depression Scale (CES-D). CES-D is a scale developed by the American National Institute of Mental Health (ANIMH) to determine the level of depression and has validity and reliability in Turkish. The scale consists of 20 questions that measure the emotional state, perceptions and behaviors of the person and are in the form of a self-report. The questions in the scale with a total of 0-60 points are coded in the 4-point likert type and 0-3 points range (Tatar & Saltukoglu, 2010).

Anxiety levels of the participants were evaluated with the The Generalized Anxiety Disorder-7 (GAD-7). GAD-7 scale is a short self-report test that evaluates generalized anxiety disorder. It is a 7-item four-point likert (0 = none, 1 = many days, 2 = more than half of the days, 3 =

almost every day) type scale that evaluates the experiences in the last 2 weeks regarding the questions asked in the scale items. The total scores obtained from the scale are 5, 10, and 15 cut-off points for mild, moderate, and severe anxiety, respectively. It is necessary to investigate and confirm the GAD-7 diagnosis with other methods for patients with a total score of 10 or more (Kroenke et al., 2007). The Turkish validity and reliability of GAD-7 has been made and it has high validity, reliability and good psychometric properties in the clinical sample, similar to the original form (Konkan et al., 2013).

Statistical Analysis

SPSS 22.00 program was used for statistical analysis. While evaluating the study data, in addition to descriptive statistical methods (Average, Standard Deviation, Median, Frequency, Ratio, Minimum, Maximum), the normality distribution of the data was evaluated using the Shapiro-Wilk Test. In study, the levels of anxiety and depression among individuals who think and do not think that their sports performance is reduced, who feel ready and do not feel ready for competitions, who need and do not need a psychological support program before returning to competitions, and who are worried about a decrease in sports performance after recovery in the possibility of experiencing COVID-19 infection, and who do not worry will be compared. For comparisons between groups, Mann-Whitney U Test was used for data that did not show normal distribution. Significance was evaluated at $p < 0.001$ and $p < 0.05$ levels.

RESULTS

89 participants with a mean age of 17.7±2.72 years were included in the study. The sports branches of the participants are shown in Table 1. The sports branches of the participants were as follows: 29.2% (n=26) basketball, 25.8% (n=23) volleyball, 7.9% (n=12) football, 7.9% (n = 7) taekwondo, 23.6% (n=21) rowing (Table 1). None of the individuals had a diagnosis of chronic disease.

Table 1. Demographic Characteristics of Players

		x	**sd**
Age (years)		17.75	2.72
Height (cm)		179.88	11.9
Body weight (kg)		71.22	14.96
BMI (kg/m^2)		22.31	5.32
		n	**(%)**
Gender	Female	41	46.06
	Male	48	53.93
Sport Branch	Basketball	26	29.2
	Volleyball	23	25.8
	Football	12	7.9
	Taekwondo	7	23.6
	Rowing	21	11.2

BMI: Body Mass Index, x: Mean, sd: Standard Deviation

Table 2. Demonstration the Training Status Before and After İsolation

Questions	Answers	n	(%)
How many hours a day did you train before isolation?	1 hour/day	10	11.2
	2 hour/day	51	57.3
	3 hour/day	22	24.7
	4 hour/day	5	5.6
	5 hour/day	1	1.1
How many hours do you train per day during the isolation process?	1 hour/day	50	56.1
	2 hour/day	29	32.5
	3 hour/day	9	10.1
	4 hour/day	1	1.1
Did you prepare your training program yourself during the isolation process or did you get help?	I prepared it myself.	49	55.05
	I got help.	40	44.9
From whom did you get help for the training program?	Trainer	28	70
	Conditioner	5	12.5
	Physiotherapist	3	7.5
	Team mate	4	10
In what way did you get help?	Whatsapp, zoom, skype etc. tools	7	17.5
	Phone call	31	77.5
	Face to face	2	5
Have you experienced any injuries during training during the isolation process?	Yes	23	25.8
	No	66	74.2
Who did you get help from when you were injured?	Physiotherapist	14	60.8
	Doctor	2	8.6
	Did not got help	7	31.8

Participants stated that their training frequency before isolation was as follows: 57.3% (n=51) 2 hours a day, 24.7% (n=22) 3 hours a day, 11.2% (n=10) 1 hour a day, 5.6% (n=5) 4 hours a day, 1.1% (n=1) 5 hours a day. During the isolation process, the participants stated that their training frequency was as follows: 56.1% (n=50) 1 hour a day, 32.5% (n=29) 2 hours a day, 10.1% (n=9) 3 hours a day and 1.1% (n=1) 4 hours a day (Table 2).

While 44.9% (n=40) of the participants stated that they got help from a professional for the training program during the isolation process, 55.05% (n=4) stated that they did not get help. Of the participants who got help for the training program, 70% (n=28) stated that they got help from their trainers, 12.5% (n=5) from a conditioner, 7.5% (n = 3) from a physiotherapist, while the remaining 10% (n=4) stated that they received help from their team mates. When asked about the way they got help, 75.6% (n=31) were using tools such as Whatsapp, zoom, skype, 17.5% (n=7) by phone call, and 5% (n=2) stated that they communicated face to face (Table 2).

While 25.8% (n=23) of the participants stated that they experienced injury while training during the isolation process, 74.2% (n=66) stated that they did not experience any injuries. While 60.8% (n=14) of those who experienced injuries stated that they got help from a physiotherapist for their injuries during training during the isolation process, 8.6% (n=2) stated that they got help from a doctor, 31.8% (n=7) reported that they did not get help (Table 2).

Table 3. Demonstration of Thinking of A Decrease in Sports Performance, Needing A Pre-Competition Psychological Support Program, Worry About A Decrease in Sports Performance in Case Of COVID-19 İnfection and Feeling Ready to Return to Competition

Questions		**Yes**		**No**	
		n	**(%)**	**n**	**(%)**
Do you think your sports performance decreased during the isolation process?		65	73	24	27
Do you think you need a psychological support program before returning to sports competitions?		31	34.8	58	65.2
Are you worried about a decrease in your sports performance in the event of having a COVID-19 infection?		47	52.8	42	47.2
Do you feel ready to go back to sports competitions?		25	28.1	64	71.9
				n	**(%)**
If your answer is no, what is the reason?	The thought that there may be a decrease in muscle strength			28	43.7
	The thought that there may be a decrease in sports-specific skills			8	12.5
	Lack of Motivation			19	29.6
	Lack of self-confidence			9	14

When the athletes were asked whether they felt a decrease in their sports performance according to their individual opinions, 73% (n=65) thought that their sports performance decreased, while 27% (n=24) thought that they did not (Table 3).

When we asked the participants whether they felt ready to participate in sports competitions, 28.1% (n=25) stated that they felt ready, 71.9% (n=64) stated that they did not feel ready; when the participants were asked about the reasons for not feeling ready for the competition, the reasons were given as follows: 43.7% (n=28) decreased strength, 29.6% (n=19) lack of motivation, 14% (n=9) lack of self-confidence and 12.5% (n=8) decreased sports-specific skills (Table 3).

Table 4. Comparison of Scales According to Thinking of A Decline in Sports Performance and Feeling Ready to Return to Sport Competitions

Scales	Groups	n	*X*	SD	p
CES-D	who thinks their sports performance is decreased	65	22.06	11.3	**0.009***
	who do not think their sports performance is decreased	24	14.75	8.58	
YAB-7	who thinks their sports performance is decreased	65	6.94	5.01	0.704
	who do not think their sports performance is decreased	24	6.21	4.08	
CES-D	not feeling ready to return to the competitions	64	22.08	10.76	**0.008***
	feeling ready to return to competitions	25	15	10.43	
YAB-7	not feeling ready to return to the competitions	64	6.83	4.8	0.766
	feeling ready to return to competitions	25	6.52	4.76	

CES-D: Generalized Anxiety Disorder-7, YAB-7: Center for Epidemiologic Studies Depression, x: Mean, sd: Standard Deviation, Statistically significant difference ($p<0.05$)

When CES-D scores were compared between those who think that their performance have decreased and those who think that they have not, the scores of individuals who think that they have decreased are found to be high and statistically significant ($p=0.009$; $p<0.01$), there was no difference between individuals in the GAD-7 score ($p>0.05$), (Table 4).

The CES-D score of the individuals who think they are not ready was found to be higher and statistically significant compared to the individuals who think they are ready ($p=0.008$; $p<0.01$), there was no difference between individuals in the GAD-7 score ($p>0.05$), (Table 4).

When participants were asked if they were worried about a decrease in their sports performance in case of a COVID-19 infection, 52.8% (n=47) said they were worried about a decrease in their performance if they had COVID-19 infection, while 47.2% (n=42)) stated that they were not concerned (Table 3); The CES-D and GAD-7 scores of the individuals who were concerned were higher and statistically significant compared to the individuals who were not concerned ($p=0.001$; $p <0.01$), (Table 5).

When the individuals were asked whether they needed a psychological support program before returning to the competition, 34.8% (n=31) stated that they needed psychological support before returning to the competition, 65.2% (n=58) said they did not (Table 3). The CES-D and GAD-7 scale scores of the individuals who said they needed a psychological support program before returning to the competition were found to be higher and statistically significant compared to the individuals who said they did not need support ($p=0.001$, $p <0.01$), (Table 5).

Table 5. Comparison of the Scales According to the Worrying of Having A Decrease in Sports Performance in Case of COVID-19 İnfection and the Need for Pre-Competition Psychological Support Program

Scales	Groups	n	*X*	SD	p
CES-D	worried about a decrease in their sports performance in case of COVID-19 infection	47	23.72	10.93	**0.001***
	not worried about a decrease in their sports performance in case of COVID-19 infection	42	16.02	9.87	
YAB-7	worried about a decrease in their sports performance in case of COVID-19 infection	47	8.47	5.09	**0.001***
	not worried about a decrease in their sports performance in case of COVID-19 infection	42	4.81	3.51	
CES-D	need pre-competition psychological support	31	28.06	9.91	**0.001***
	not need pre-competition psychological support	58	15.83	9.2	
YAB-7	need pre-competition psychological support	31	9.39	4.36	**0.001***
	not need pre-competition psychological support	58	5.33	4.38	

CES-D: Generalized Anxiety Disorder-7, YAB-7: Center for Epidemiologic Studies Depression, x: Mean, sd: Standard Deviation, Statistically significant difference ($p<0.05$)

DISCUSSION AND CONCLUSION

In our study, it was determined that the vast majority of athletes thought that their performance decreased during the isolation process, they were not ready enough to return to sports competitions, and they were also worried about a decrease in their sports performance within the possibility of having COVID-19 infection, and it was observed that they were negatively affected in terms of mental health in this process. In our study, it was observed that most of the athletes had a decrease in their training time compared to before isolation. It was thought that the inability of athletes to do sports-specific training due to the lack of suitable areas for training during the pandemic and staying at home, shortened their training time. When the reasons why the athletes were not ready to return to the sports competitions were investigated, it was seen that they experienced a decrease in their motivation and self-confidence, together with a possible decrease in muscle strength and sports-specific skills as a result of not doing enough training. All these negative effects show that athletes, who have to spend their time at home for a long time during the global pandemic processes, may need physical and mental support programs before starting the sports competitions. In addition, providing athlete-specific support programs online to prevent loss of athletes' performance in global pandemic processes can reduce the harmful effects of quarantine processes.

'De-training' results in the total or partial loss of training-induced gains from previous training (Mujika and Padilla, 2001). It is dangerous for athletic performance if stopping the workout or significantly reducing its intensity causes a partial or complete loss of previously improved performance (Hawley and Burke., 1998). For example, it has been reported that senior male kayakers have deteriorated neuromuscular performance after 5 weeks of reduced intensity training and after complete cessation of training (García-Pallarés et al., 2010) Another study concluded that regardless of the intensity of previous endurance and resistance training, only 2-4 weeks of training interruptions can result in a significant performance loss (Muñoz-Martínez et al., 2017). Decreases in maximum and submaximal exercise performance occur within weeks after cessation of training, and these losses in aerobic performance reduce cardiovascular function and the metabolic potential of muscles (Neufer et al., 1987, Izquierdo et al., 2007). In addition, it has been reported that not doing flexibility exercises for 8 weeks in athletes causes a decrease in flexibility (Caldwell et al., 2009). Reduced or complete absence of strength training has also been shown to cause a loss of muscle mass in athletes (Neufer et al., 1987). After a period of inactivity of 8 to 12 weeks, the strength and performance of team sports athletes decreased by 7% - 12% (Mallinson and Murto, 2013).

In our study, it was observed that the individuals had a decrease in training hours during the isolation process compared to the pre-isolation period, and they had a "de-training period". It was thought that this situation might cause individuals to decrease their motivation and think that their performance decreased. It was thought that a detailed and branch-specific exercise prescription was needed in order to minimize the negative effects of the athletes from negative consequences such as a decrease in muscle mass and cardiovascular functions after "de-training" during the isolation process. In addition, it was thought that sports managers should give sufficient time to the athletes before starting the sports competitions, to allow adaptation before restarting the sports competition, and to implement a gradual loading program aimed at reducing the risk of injury.

While training athletes at home during isolation, the intensity and volume of the exercises will be a matter of concern. It may be difficult to monitor and ensure that the weights used by athletes during home training are appropriate and sufficient to keep physical fitness and performance at the required level. While it is possible for normal people to maintain physical fitness with a simple exercise program at home, this is not possible for senior athletes (Koundourakis et al., 2014).

Unsupervised training can expose athletes to injury if done with poor technique and posture (Izquierdo et al., 2007). In our study, it was observed that some of the individuals suffered injuries and received help from their physiotherapists during the training during the isolation process. In addition, almost half of the athletes reported that they received help from their trainers through online communication while planning their training, while other athletes were observed to plan their training by themselves and did not get help. Especially considering the risk of injury and the need for supervision, it was thought that there was a need to encourage and make widespread communication between sports professionals such as trainers and physiotherapists and athletes through online platforms. In isolation processes, the importance of organizing appropriate guidance and support given to athletes by sports professionals (physiotherapist, sports coach, strength and conditioning coach, nutritionist, doctor, psychologist) using technology (video call, e-mail, phone, text messages) is emphasized (Aicale et al., 2018). In this sense, it was thought that there was a need for researches on which ways to reach athletes remotely from their homes are more effective, which tele-assessment methods can effectively evaluate the athlete, and the development of platforms that can provide a multidisciplinary accessibility.

Prolonged inactivity, staying away from the team environment, lack of competitions, less qualified interactions with coaches and lack of social support (e.g. fans, sports organizations, media, etc.) negatively affected the athletes psychologically (Jukic et al., 2020). Sports psychologists report a higher demand for online psychological counseling and diagnosis of psychological disorders in the athlete population during the pandemic.

Among the reasons for applying; Fear of being infected, anxiety not fully recovering physically if infected, lack of access to fitness centers, poor quality sleep, eating disorders, obsessive-compulsive disorder, and family conflicts (Mehrsafar et al., 2020). Inability to manage stress and lack of coping may cause some to experience short or long term depression (Mehrsafar et al., 2020). The athlete participants included in our study stated that they feared infection, thought their sports performance decreased and they were not ready to return to sports competitions, and it was determined that these individuals were negatively affected in terms of mental health and had high levels of anxiety and depression. The results suggested that athletes needed psychological diagnosis and treatment counseling by sports psychologists, both online during the isolation process and before the sports competition.

COVID-19 is thought to have physical and psychological consequences that can affect the safe return of athletes to sports and their general health, and these consequences will adversely affect the future of athletes and the sports sector and may increase the workload on health systems (Frank et al., 2020). Since most of the individuals participating in the study were athletes engaged in team sports, it was thought that there is a need for further studies comparing the level of influence of athletes who do individual and team sports from this process. Considering that these and similar processes can be repeated, it is thought that developing telerehabilitation systems for athletes may be beneficial. As a result, it is thought that the government and teams should support athletes in order to prevent the risks that may occur, and prepare guidelines to ensure a safe return to sports and these guidelines should be implemented as soon as possible.

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RESEARCH ARTICLE

Comparison of Selected Physical and Performance Characteristics in University-Level Male Basketball, Football and Volleyball Players

Meltem Koç[1], Özge İpek DONGAZ[2], Banu BAYAR[3] and Kılıçhan BAYAR[4]

[1,2,3,4]Muğla Sıtkı Koçman University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Muğla, Turkey
*Corresponding author: kcmeltemm@gmail.com

Abstrac

The purpose of present study was to compare the selected physical and performance variables of university-level basketball, football and volleyball players. The present study was conducted by 23 students studying in the faculty of health sciences and playing in their school's Football (n = 7), Volleyball (n = 8), Basketball (n = 8) teams and the age ranged from 18-23 years. Several physical and physiological characteristics of the students were evaluated. These characteristics are weight, height, BKI, flexibility, isometric muscle strength, muscular endurance, aerobic and anaerobic performance. While comparing between sports disciplines, one-way analysis of variance (ANOVA) was used for data with normal distribution, and Kruskal Wallis test was used for non-distributed data. The results of the study indicate that there was significant difference among Basketball, Volleyball and Football in relation to VO2 Max, muscle strength, anaerobic power. The aerobic performance test was significantly better in volleyball ($p \leq 0.05$). However, there was no statistically significant difference in the results of physical properties, muscle endurance and flexibility among teams ($p>0.05$). These results will provide useful information for university level athletes to be selected according to sports-specific physical fitness criteria and that they should receive training by team coaches accordingly.

Keywords
Physical Fitness, Basketball, Volleyball, Football

INTRODUCTION

Success in sports is made possible by the complex interaction of many factors such as motivation level, psychosocial status, physical and physiological characteristics of players in both individual and team sports. However, physical fitness is an important component when considering the nature of the sport that is considered to be chosen and also the maintenance of success in that particular sports type. In team sports, a single anthropometric feature or fitness profile is generally not expected to be strong.

The reason for this is that such sports are competitive and it requires many fitness profiles in order to be good together as a team, furthermore their complex relationships with each other are also very significant. For example, a volleyball player is expected to have significant strength, flexibility, speed, agility and endurance. However, some parameters may have a more profound effect on success in sports when compared with others. For example, the vertical jump is more important for basketball and volleyball players, rather than football players. For this reason, reference fitness profiles have been created in many studies with

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[1]ORCID: 0000-0001-6456-8779, [2]ORCID: . 0000-0001-9984-7460 , [3]ORCID: 0000-0001-8686-1861, [4]ORCID: 0000-0002-8090-5859

elite athletes (Di Salvo et al., 2007; Peña, Moreno-Doutres, Coma, Cook, & Buscà, 2018). In amateur teams, school teams or recreational sports, these fitness features, in general, are not considered. However, the fact that some athletes, with an inappropriate fitness profile, take place in a sport discipline, will not only decrease the success in sports but also may cause serious injuries. However, although the physical fitness characteristics of elite players are known, the data on these features of university level players are limited. Therefore, in the present study, it was aimed to analyze and compare some anthropometric and physical properties of football, volleyball and basketball teams created for a sports competition between faculties in a university. The results of the present study with university-level players will provide useful information to other professionals interested in sports, especially team coaches.

MATERIALS AND METHODS

The present study was conducted as cross-sectional descriptive study design. The local University Ethics Committee approved the study protocol design (ethic code: 80/81), which respected the principles of the Declaration of Helsinki (1975 and further updates). All the individuals signed an informed consent form. The present study included 23 male students playing on the faculty school team and agreeing to participate in the study voluntarily.

Inclusion criteria were as follows:

- Students who have played on the faculty team for at least two years
- Students who regularly participate in training sessions twice a week and to play in the team in inter-university competitions at the end of the year.

Exclusion criteria were as follows:

- Students who smoked, had chronic disease and had any surgery in the last 5 years.

The students participating in the study were divided into 3 groups as football (n=7), basketball (n=8) and volleyball (n=8) according to the team they played. Some different selected physical variables (height, body weight) and performance characteristics (flexibility, muscle strength, muscular endurance, aerobic and anaerobic performance) were evaluated. This approach allowed comparisons between teams to define a fitness profile in each of them. All evaluations were made by evaluators (M.K and O.I) who did not know which team the student was playing. The subjects were allowed to rest for 5 min between tests.

Procedures

The following describes how physical fitness components are assessed.

Height, Weight and BMI

Height was measured to the nearest 0.1 cm using a wall-mounted stadiometer, and weight was measured to the nearest 0.1 kg using a digital scale after all outer clothing (only formal team clothes) and shoes were removed. In addition, Body mass index (BMI) calculation was performed for weight body (kg) / height $(m)^2$ formula (Deurenberg, Weststrate, & Seidell, 1991).

Flexibility

A sit and reach test was performed to determine the lumbar region and hamstring flexibility of the individuals. A standard sit and reach test was performed using an sit and reach box with a height of 30.6 cm. The box was set on an examining table (height 74 cm) where the sit and reach test was performed. The subjects sat with their feet approximately hip-wide against the testing box. They kept their knees extended and placed the right hand over the left, and slowly reached forward as far as they could by sliding their hands along the measuring board. Reaches short of the toes were recorded as negative forward reach scores and reaches beyond the toes were recorded as positive forward reach scores. The test was repeated three times and the best value was recorded (López-Miñarro, Andújar, & Rodrñguez-Garcña, 2009).

Anaerobic Power

Participants' anaerobic power was assessed with vertical jump (VJ) test. First, when the feet were adjacent and the body was in a vertical position, the double-arm was extended up to mark the last point where the fingertips contacted. Then the participant tried to contact the board by splashing all the power up with the double foot (This should not take a step during the upward

bounce, but it may bend the knees). Secondly, the place where the board was contacted was marked. The distance between two points was measured. This process was repeated three times and the best value was recorded. Anaerobic power was calculated using the Lewis formula using vertical jump distance and body weight.

Average Power = (square root of 4.9) x body mass (kg) x (square root of jump distance (m))

Aerobic Performance

Aerobic performance was tested by the Cooper performance test. Individuals were told to run for 12 minutes on the track at the speed they wanted on the track, or if they could not keep running, they would walk. For the test, subjects were encouraged to run/jog the entire distance but were told they could walk, if necessary. The total distance (in meters) taken at the end of 12 minutes was calculated by multiplying the total number of tours with 400 meters (the distance traveled in the last non-completed tour was added as a meter). The distance unit was converted from metro to km. The following formula was used to estimate VO_2 max (Meredith & Welk, 2003).

Estimate VO_2 maximum ($ml \cdot kg^{-1} \cdot min^{-1}$) = (22.351 x distance covered in kilometers) - 11.288

Muscle Strength

The Fei Lafayette Manuel Muscle Tester electronic dynamometer was used to determine the isometric muscle strength of individuals (Lafayette Instrument Company, Lafayette, Ind., USA). Muscle strength of 3 gross muscle groups (shoulder flexor, hyper extensor and abductor) in the upper extremity and 4 gross muscle groups in the lower extremity (knee extensor and flexor, hip extensor and flexor) were evaluated by the same researcher (O.I). All the tests performed to evaluate the maximum isometric muscle strength were repeated twice, giving a rest interval of one minute. The digital score on the dynamometer for the peak values was recorded for each trial and the best score was recorded in kilograms (Andrews, Thomas, & Bohannon, 1996; Fosang & Baker, 2006).

Muscle endurance

The push-ups test and the sit-ups test were used to assess muscle endurance. Between the two tests, individuals were given a resting time of 5 minutes. Standard Push-up test used for assessing the endurance of the arm, shoulder extensor muscle group and trunk stabilizer muscles. When executing a push-up an individual start in the “up” position with the arms straight, lowers the body to the “down” position, and then raises it to the up position. Throughout the execution of a push-up, the body is supposed to be kept straight. When the push-up is used as a test, failure to correctly assume the down position or up position, or keep the body straight, results in a push-up not being counted. The researchers recorded the number of correct push-ups in the 1-minute push-up test. Participants were encouraged to give maximal effort during the test. The detailed test procedure of the push-up test was carried out as stated by Baumgartner et al (Baumgartner, Oh, Chung, & Hales, 2002).

Standard Sit-ups test was used for assessing the endurance of abdominal muscles and hip flexors. The sit-up protocol required the participant to perform as many bent knee sit-ups as possible in 1 minute. Participants laid in a supine position with the knees bent and feet flat on a mat. The hands were placed on the side of the head with fingers over the ears. The participants elevated the trunk until the elbows made contact with the legs. They reversed directions until the shoulder blades touched the mat. The feet were secured by the test examiner who counted the sit-ups during the 1-minute test. Participants were encouraged to give maximal effort during the test (Jackson et al., 1998).

Statistical Analysis

Statistical analysis of the study was done using the SPSS 22.00 Windows package program. The data were expressed as mean ± standard deviation (X ± SD). Before the use of any parametric or nonparametric test, each log normality analysis was performed with Kolmogorov-Smirnov. In comparison of physical fitness components, One-way ANOVA was used for the data with normal distribution and Kruskal-Wallis test was used for data with non-distribution data. When significant differences were found, we proceeded to compare between groups with a Tukey post hoc analysis in the case of the ANOVA, and Games-Howell post hoc analysis for Kruskal–Wallis. The significance level for the tests was established at $p \leq 0.05$.

RESULTS

Anthropometrically, there was no statistically significant difference between the players of the three teams according to the one-way ANOVA. The average age, height, body weight and BMI of the teams are given in Table 1.

Table 1: Physical features of the subjects participating in the study

	Male Basketball Mean±sd	Male Volleyball Mean±sd	Male Football Mean±sd
Age (year)	20.62±1.68	20.12±0.64	21.42±0.78
Height (m)	1.82±0.05	1.78±0.44	1.77±0.09
Weight (kg)	74.37±12.87	73.62±7.34	75.42±9.6
BMI (kg/m^2)	22.24±3.29	23.15±1.94	24.02±2.27

BMI: Body Mass Index

There was no statistically significant difference between the teams in sit-and reach test and muscle endurance tests. VJ tests indicated significant differences between teams (p<o.o5). Basketball players showed better performances when compared to volleyball and football players in the VJ test. Similarly, Cooper tests indicated significant differences between teams (p<o.o5). Volleyball players had a higher cooper distance average than other sports teams (Table 2).

Table 2: Performance test results of the subjects participating in the study

	Male Basketball X±SD	Male Volleyball X±SD	Male Football X±SD
Sit and Reach Test (cm)	-5±12.27	1.5±10.83	0.85±13.59
Vertical Jump Test			
Power (kg.m/sn)*[a,b]	111.13±21.10	118.25±11.49	120.57±15.91
Distance (cm)*[a,b]	53.62±5.26	47.87±4.48	45.1±2.34
Cooper Test			
MaxVO$_2$ (ml·kg^{-1}·min^{-1})*[a]	31.17±5.85	42.63±6.59	25.77±20.73
Distance (km)	1.90±0.2	2.41±0.2	1.42±0.9
Muscular Endurance			
Sit-ups	30.1±4.29	43.85±17.28	35.85±11.45
Push-ups	24.6±14.37	24.75±14.45	25.85±12.96

*p<0.05, [a]Basketball vs. volleyball, [b]Basketball vs. football, [c] football vs. volleyball

In the isometric muscle strength tests, when the right-side muscle strengths of the teams were compared, there was a significant difference between the teams except shoulder extension, abduction and hip flexion. When the left-side muscle strengths were compared, there was a significant difference between the teams except for shoulder abduction. The values obtained from the test and the differences between teams are presented in Table 3.

Table 3: Values obtained from isometric muscle strength test (expressed in N m/k)

		Basketball (n=8) X±SD	Volleyball (n=7) X±SD	Football (n=8) X±SD
Arm Flexor	Right*[b,c]	16.87 ±1.19	21.02 ± 2.32	15.31 ± 1.94
	Left*[b,c]	16.07 ± 1.41	22.22 ± 1.81	14.76 ± 2.27
Arm Abductor	Right*[b,c]	15.93 ± 1.79	21.54 ± 2.16	16.63 ± 3.90
	Left*[b]	15.33 ± 1.13	20.45 ± 2.13	16.46 ± 4.35
Arm Extansor	Right	11.67 ± 1.41	12.78 ± 2.86	12.57 ± 2.60
	Left	10.96 ± 0.61	13.20 ± 1.96	11.20 ± 3.46
Knee Flexor	Right	18.03 ± 1.99	16.12 ± 7.53	16.78 ± 2.81
	Left	17.23 ± 2.22	19.25 ± 4.23	16.01 ± 2.53
Knee Extansor	Right	16.76 ± 1.69	15.27 ± 7.40	15.45 ± 3.16
	Left	15.78 ± 1.92	17.78 ± 1.67	15.17 ± 4.36
Hip Flexor	Right*[b]	18.38 ± 0.66	21.81 ± 2.20	21.08 ± 3.85
	Left*[b]	18.45 ± 1.25	21.54 ± 1.40	19.81 ± 3.42
Hip Extansor	Right*[a,c]	18.87 ± 8.45	22.02 ± 2.32	16.88 ± 2.62
	Left*[a,c]	21.78 ± 3.51	21.27 ± 2.72	16.31 ± 2.13

*p<0.05, [a]Basketball vs. volleyball, [b]Basketball vs. football, [c] football vs. volleyball.

DISCUSSION

In the present study, some physical and performance-related features of university-level male football, basketball and volleyball players were compared. The findings of the study confirmed that there was a significant difference obtained on anaerobic power, aerobic performance and isometric muscular strength. On the other hand, there was no significant difference obtained on physical properties, flexibility and muscular endurance. In the current section, the results of the present study have been compared with other studies researching similar features in university-level male football, volleyball and basketball teams.

In this study, there was no difference between the teams in terms of physical characteristics such as height, weight and BMI. However, it is a well-known fact that height is an important determinant for basketball players. Teams that include tall players in basketball have a much significant advantage over other teams, especially in the under-ground fight (Torres-Unda et al., 2013). Unlike performance, especially in adulthood, anthropometric values such as height is not possible to be changed with training. Therefore, this property needs to be taken into consideration during the selection process of the athletes for the basketball team.

Flexibility is one of the most important elements in order to prevent injuries. In the present study, the flexibility value of all teams was very low and there was no significant difference between the teams. Similarly, there was no significant difference in the sit and reach test in Rajveer Singh's study with 30 male university-level football and volleyball players (R. Singh, 2019).In present study, the highest VJ distance was found in basketball players. The highest anaerobic power in the VJ test was found in the volleyball players in the study of Marangoz et al. [wrestling (n=15), gymnastics (15), football (15), handball (15), volleyball (15) and basketball (n= 15)] with 90 male university-level Turkish athletes from different disciplines (Marangoz & Baştürk, 2018). Similarly, in a comparison study with the university-level male volleyball (n = 150) and basketball (n = 150) teams, Anita Singh conducted that the VJ test is much higher in volleyball (A. Singh, 2017).

In this study, Max VO_2 of volleyball players was quite high compared to the other teams. In a study conducted by Mishra et al., 59 university-level males players with age range 20-25, with variables taken from basketball, football and

volleyball players, it was found that the highest Max VO_2 was within the football players (Mishra, Pandey, & Chaubey, 2015). Bag et al., in a study with university-level male volleyball (n = 15) and football (n = 15) players found that the cardiovascular endurance of football players (1.82 min.) was higher than in volleyball players (Bag, Borman, Das, & Chawdhury, 2015).

Muscle strength and endurance are an important component for success in team sports when combined with technical skills. In present study, when the sit-up and push-up tests were applied, in terms of muscle endurance there was no significant difference between the teams. In terms of muscle strength, a significant difference in shoulder and hip muscles was observed, however, there was no significant difference observed in knee muscles. Again, in a study conducted by Bag et al., the muscle endurance of football players (39.86 times sit ups) was higher than volleyball players (38.73 times sit ups), and the muscle strength of the football players (5.33 times/min. pull ups) was higher than volleyball players (4.87 times/min. pull ups) (Bag et al., 2015). In Rajveer Singh's study with 30 male university-level football and volleyball players, the football players were better in muscle strength and endurance tests (R. Singh, 2019). Furthermore, a study conducted by Nandalal Singh et al. with 80 players in different sports (20 for each game i.e., football, hockey, basketball and volleyball) found that the highest muscle endurance belonged to football players (T. N. Singh & Kaur, 2019).

Above, the results of physical characteristics and performance-related features in other Turkish and international players are compared with the results of our study. Results differ from each other. The reason for this may be that in our study, the students were not selected according to the team-specific physical fitness criteria or their training was insufficient. However, in a sports discipline, basic physical and performance criteria should be provided, otherwise it prevents success, motivation and may cause injuries. In this sense, the results of the present study will provide useful information to team coaches and sports physiotherapists.

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RESEARCH ARTICLE

Evaluation of the Student's Self Awareness, Physical Activity, Sleep Quality, Depression and Life Satisfaction of University Students During the COVID-19

Elif DİNLER[1], Tuğba BADAT[2], Deniz KOCAMAZ[3] and Yavuz YAKUT[4]

[1,2,3,41]Department of Physiotherapy and Rehabilitation, Faculty of Health Science, Hasan Kalyoncu University, Gaziantep, Turkey
*Corresponding author: deniz.erdankocamaz@hku.edu.tr

Abstract

Background/aim: The aim of this study is to evaluate the levels of self-awareness, physical activity, sleep quality, depression and life satisfaction of university students during the Covid-19 pandemic period. **Materials and methods:** 200 university students (133 female, and 67 male) who agreed to participate in the study voluntarily were included. The average age of the students was 21.57±2.03. The students replied about the effects of pandemic process with Likert scale that 14 questions. The International Physical Activity Questionnaire (Short Form) (IPAQ-SF), Pittsburgh Sleep Quality Index (PSQI), Beck Depression Scale (BDI), Life Satisfaction Questionnaire (SLWS) were applied to students. **Results:** According to the results of the study; In the term of Covid-19, it was determined that physical activity and exercise habits were decreased. The participants with good sleep quality. Among the questions in the self-awareness questionnaire, the most frequently participated question by the students was 66% increase in sitting time and the least agreed 2% decrease in sitting time. Among these questions, the significance level is p = 0.01. **Conclusion**: During the Covid-19 process, students' self-awareness, physical activity levels, sleep quality and life satisfaction found to be high, and the severity of depression low during the online / distance education period. We think that long-term follow-up studies during the pandemic process will contribute to the literature.

Keywords
Covid-19, Physical Activity, Sleep, Depression, Awareness, Distance Education

1. INTRODUCTION

Covid-19 infection is a new coronavirus epidemic that first appeared in Wuhan, China at the end of 2019 and has become effective worldwide in a short time (Şencan and Kuzi, 2020). The virus has been identified by the World Health Organization (WHO) as an international public health problem and has been declared to be a pandemic (Mollayeva et al., 2016, İnal İnce et al., 2020). With the Covid-19 outbreak, public health measures have emerged to control diseases. While social isolation and quarantine were recommended at the beginning of the pandemic, with the progress of the process, new normalization studies started all over the world (World Health Organization, 2020).

During the Covid-19 process, some voluntary or involuntary changes occurred in their lives due to the continuation of education in universities with distance education and continuing

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[1]ORCID: 0000-0003-0198-1456, [2]ORCID: 0000-0002-0484-0221, [3]ORCID: 0000-0002-0611-7686, [3]ORCID: 0000-0001-9363-0869

social isolation of students. The pandemic period, which requires the development of self-awareness in particular; students struggle with problems requiring physical effort such as decrease in physical activity level, circadian rhythm sleep problems, and psychological factors (Rastegar Kazerooni et al., 2020).

In a study conducted on students of pharmacy faculty, distance education period positively affected the academic performance of students. (Gossenheimer et al., 2017). Physical activity and exercise increased the quality of life, studies have suggested that it has positive effects on the reduction of depression, development of student's awareness and the related high success rates. In a study involving different exercise modalities and based on physical activity, it was determined that the self-awareness of individuals who received exercise training increased (Patel et al., 2018). It has been shown in studies that physical activity and exercise have positive effects on life quality and depression (Fisher et al., 2019).

Another important issue on quality of life and health is sleep. Considering the studies on sleep times and sleep quality in university students, it has been observed that there have been significant changes in recent years and the sleep quality of the students has decreased by decreasing their sleep times. Psychological health problems have been observed in individuals with poor sleep quality (Aysan et al., 2014).

During the Covid-19 process, especially in this period, during which the sedentary life is more active, systematic and regular physical activity programs will contribute to the physical and mental change of the person and increase their well-being (Kaya et al., 2018). A high level of physical activity will be extremely effective on sleep quality, depression severity and quality of life, and it is important to develop individual physical activity / exercise programs for this. Exercise programs developed specifically for the individual can be carried out effectively, especially during the social isolation period (Lee, 2020). In addition, increasing physical activity levels with exercise programs prepared specifically for individuals will enable them to enjoy life more (Tunay, 2008) In addition to the abundance of studies on quality of life, there are not enough studies in the field of physiotherapy in terms of life satisfaction. The fact that social isolation and distance education are experienced around the world, increasing the awareness of students is essential for us to continue their education and training life at home as much as possible. In this context, it will be beneficial in terms of public health to carry out studies that focus on individual exercise programs, increase the physical activity levels of students and increase sleep quality, reduce depression and increase life satisfaction.

In the light of these information, the aim of this study is to evaluate the levels of self-awareness, physical activity, sleep quality, depression and life satisfaction of university during the Covid-19 pandemic process.

2. MATERIALS AND METHODS

2.1. Study design and Ethics approval

This study is a cross-sectional descriptive-analytic and survey-based study. All participants were properly informed about the study. Ethics approval was obtained from the Local Ethical Committee (date-decision no: 24/04/2020-2020/20). The study was conducted in accordance with the principles of the Declaration of Helsinki. All measurements were completed on online platform. The evaluations were administered by authors who are physiotherapist.

2.2. Participants

All participants were students in Hasan Kalyoncu University, Faculty of Health Sciences and Department of Physiotherapy and Rehabilitation in Gaziantep. All the data were collected between April and July 2020. Participants were eligible for the study if they (a) were from 18 to 30 years of age, and (b) had no previous history of depression. Participants who underwent had positive diagnosis of Covid and contacting people with Covid were excluded from the study. The risk status of the students was checked by HES application.

For the 266 university students 95% confidence coefficient, $\alpha = .05$ significance and 5% tolerance level was calculated as the sample size. Students were invited to participate in the study in 3 different periods. A total of 200 (133 females, 67 male) students voluntarily participated in the study. It was the 75.1% of the total universe. The Consolidated Standards of Reporting Trials (CONSORT) table which depicts patient flow throughout the study were given on Figure 1.

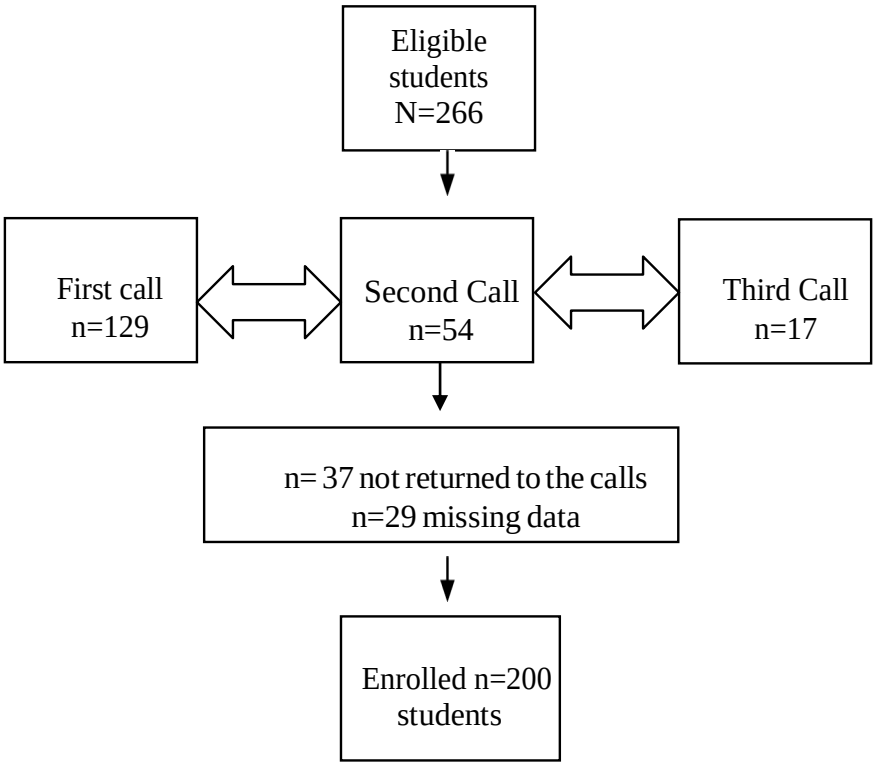

Figure I. Flow Chart For Participants (The Consolidated Standards of Reporting Trials)

Students were asked to be include voluntarily of the study. The participants were motivated as that they have an important contribution to the development of pandemic process and distance education.

2.3. Evaluation Methods

The demographic characteristics including age, gender, height, weight were recorded. Patients completed standard and non-standardized instruments. All participants completed standard instruments included that sleep quality (Pittsburgh Sleep Quality Index-PSQI), life satisfaction (Satisfaction With Life Scale-SWLS), physical activity (International Physical Activity Questionnaire-Short Form IPAQ-SF), and depression (Beck Depression Inventory- BDI) questionnaires.

The PSQI is a self-rating questionnaire resulting in a global score between 0 and 21 higher scores indicate worse sleep quality (Mollayeva et al., 2016). The SWLS is a well-known and well-used instrument of the cognitive-judgmental component of subjective well-being. The coefficients alpha of SLWS have ranged from 0.79 to 0.89 (Lorenzo Seva et al., 2019). The IPAQ-SF has been recommended as a cost-effective method to assess physical activity for the last 7 day's report (Lee et al., 2011). The BDI is a 21-item self-reporting inventory for evaluating the depression in normal and psychiatric populations (Jackson Koku, 2016).

There were 14 questions asked the student with non-standardized instrument. In additionally, 14 questions were asked the student with non-standardized instrument. It was used to guideline for this study designed for collect data on the views about to the pandemic process on physiotherapy students. Data were obtained by a questionnaire, prepared by the researchers *(they have 5-10-35 years of experience on physiotherapy and rehabilitation)* according to the literature. The questionnaire was edit and confirmed by a professional department in terms of terminology and expression. Likert type scale was used in 14 questions (1 for totally disagree up to 5 for totally agree) which were including completely agree,

agree, no idea, disagree and completely disagree. The purpose of the study was explained to the students and the online questionnaires were taken to them. It was optional for students to write their identity for the reliability of the feedback.

2.4. Statistical analysis

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS Version 22, Armonk, NY: IBM Corp.). The level of statistical significance was set at p<0.05. The variables were investigated by visual (histograms, probability plots) and analytical methods (Shapiro-Wilk test) to determine whether they were normally distributed. Descriptive statistics were calculated for all variables, and the data were shown as mean±standard deviation (SD±SS), median (minimum-maximum), frequencies and percentages. Demographic data of students was compared using Independent sample-test and expressed 95% confidence interval (CI). Gender difference was compared using Chi-Square Test. Since data (depression, physical activity and sleep quality) were not normally distributed, comparisons were performed using Mann–Whitney U test. Spearman correlations were calculated to all parameters. The significance level was accepted $p < 0.05$.

3. RESULTS

133 (66.5 %) female and 67 male (33.5 %) students participated in this study. The average age of the students was 21.57±2.03 (min:19, max: 29).139 (69.5 %) of the students in the participant did not smoke. Students were called in the study in 3 different periods. In the first call, 129 (66.5 %) students, in the second call 54 (27 %) students and the last call 17 (8.5 %) students completed the online form. The term of the students and the place they live in the pandemic process are given in Table 1.

Table 1. The Class Distribution of the Students and the Place They Live in The Pandemic Process.

	Frequency (n)	Percent (%)
First Year	48	24
Second Year	25	12.5
Third Year	68	34
Four Year	59	29.5
TOTAL	200	100
Big-city	147	73,5
City	29	14,5
District	21	10,5
Village	3	1,5
TOTAL	200	100

The opinions of the students evaluated the questionnaire that prepared with the Likert scale regarding physical activity and sleep circadian rhythm in the pandemic process. In the results of the questionnaire self awareness of the students were similar in terms of gender. The life satisfaction of the students were high, and not differ by gender during the pandemic process (p> 0.05). According to the results of our study, the level of depression (BDI) was higher in women. Sleep quality (PSQI) was found better in men. (p <0.05) Data on physical activity, sleep quality, depression and life satisfaction findings by gender are given in Table 2.

Table 2. The Physical Activity, Sleep Quality, Depression and Life Satisfaction Results of Students.

	Female (n=133)		Male (n=67)			
	X	SD	X	SD	Z	p
Q1	4,02	1,09	3,64	1,30	1,865	0,062
Q2	4,47	0,86	4,40	0,99	0,263	0,793
Q3	3,78	0,97	3,72	1,04	0,406	0,685
Q4	3,83	1,12	3,81	1,15	0,180	0,857
Q5	3,68	0,96	3,52	1,21	0,669	0,503
Q6	2,34	1,15	2,30	1,30	0,534	0,593
Q7	2,54	1,23	2,49	1,38	0,465	0,642
Q8	1,77	0,92	1,82	1,14	0,308	0,758
Q9	2,75	1,26	2,66	1,44	0,618	0,537
Q10	2,87	1,36	2,66	1,48	1,115	0,265
Q11	2,71	1,30	2,70	1,41	0,129	0,897
Q12	2,63	1,35	2,58	1,50	0,361	0,718
Q13	2,65	1,31	2,55	1,45	0,633	0,527
Q14	2,57	1,42	2,39	1,47	1,053	0,292
Total Beck Score	17,14	11,28	12,28	10,05	3,081	0,002*
Total SWLS Score	24,62	6,84	26,36	6,45	1,812	0,070
Total PSQI Score	8,42	3,49	7,37	3,42	2,078	0,038
IPAQ high intensity exercise	243,76	704,70	469,85	949,06	1,358	0,174
IPAQ moderate exercise	408,04	849,79	171,40	482,29	3,145	0,002*
IPAQ walking	470,08	837,85	529,21	970,10	0,134	0,893
IPAQ sitting	349,17	384,09	330,45	363,86	0,055	0,956
Total IPAQ	1471,25	1979,26	1720,31	2669,13	0,053	0,957

* $p<0.05$, Mann Whitney U test.

According to the results of the study, a moderate negative correlation was found between life satisfaction and depression (r: - 0.488) and between life satisfaction and sleep quality (r: -0.308). A moderate correlation was found between sleep quality and depression (r: 0, 505). A low level relationship was found between physical activity and depression (r: 0.025). A low negative correlation was found between physical activity and sleep (r: -0.083) and between physical activity and life satisfaction (r: 0.018) (Table 3).

Table 3. The Relationship of Physical Activity Level, Sleep Quality, Depression Level and Life Satisfaction Data of University.

		BDI Total	SWLS Total	PSQI Total	IPAQ high intensity	IPAQ moderate intensity	IPAQ walking	IPAQ sitting
BDI Total	r	-						
	p	-						
SWLS Total	r	-0,488						
	p	0,000						
PSQI Total	r	0,505	-0,308					
	p	0,000	0,000					
IPAQ high intensity	r	-0,088	0,142	-0,087				
	p	0,214	0,045	0,218				
IPAQ moderate intensity	r	0,005	0,037	-0,072	0,275			
	p	0,947	0,604	0,312	0,000			
IPAQ walking	r	-0,016	-0,080	-0,051	0,173	0,427		
	p	0,823	0,261	0,470	0,014	0,000		
IPAQ sitting	r	0,236	-0,110	0,009	0,080	0,128	0,238	
	p	0,001	0,120	0,899	0,260	0,070	0,001	
IPAQ Total	r	0,025	-0,018	-0,083	0,522	0,625	0,707	0,511
	p	0,726	0,796	0,244	0,000	0,000	0,000	0,000

Spearman Correlation Test

The responses were scored based on the Likert scale, from 1 to 5 points for "totally disagree" through "totally agree" comments. First and second highest scores were pertained to “Q2- I spent more time sitting during the pandemic.” (4.5±0.9 and 3.89±1.17, respectively) and the least score was to “Q6-My physical activity level increased during the pandemic." (2.33±1.20) which were statistically significant ($p<0.05$). The questionnaire items and the students’ responses about pandemia process given in Table 4.

The relationship between the scores of participants for the duplicated control question was calculated by Pearson’s product-moment correlation coefficient as $r=0.91$, $p<0.01$. Thus, it can be said that the participants answered the questionnaire honestly. According to the results of the student' self awareness questionnaire developed within the scope of our study, 48% of the participants stated that the sitting time in the pandemic period was increased. 26 % of the students thought that their physical activity level increased. While 34 % thought that they spent more time for themselves, 33 % stated that they learned new things (Table 5).

Table 4. The Questionnaire Items and the Students' Responses About Pandemic Process with Frequencies.

	Completely disagree	Disagree	No idea	Agree	Completely agree	X±SD
Q1-My sleep pattern was disturbed during the pandemic.	7	21	44	43	85	3.89±1.17
Q2- I spent more time sitting during the pandemic.	3	5	23	38	131	4.45±0.90
Q3-I started taking more time for myself during the pandemic.	5	10	68	62	55	3.76±0.99
Q4-I began spending more time with my loved ones during the pandemic.	8	16	51	53	72	3.83±1.13
Q5- I learned new things during the pandemic.	6	22	59	67	46	3.62±1.05
Q6-My physical activity level increased during the pandemic.	63	53	54	16	14	2.33±1.20
Q7- The time I spent doing sports increased during the pandemic.	53	53	50	24	20	2.52±1.28
Q8- I spent less time sitting during the pandemic.	104	52	31	9	4	1.79±1.00
Q9- I encouraged my family to actively participate in home exercises during the pandemic.	46	46	52	30	26	2.72±1.32
Q10- I enjoyed the time doing exercises with my family at home.	48	43	42	35	32	2.80±1.40
Q11- My parents were enthusiastic about doing home exercises during the pandemic.	53	34	54	37	22	2.70±1.33
Q12- I encouraged my parents to do breathing exercises at home during the pandemic	64	32	44	37	23	2.61±1.40
Q13-.I had my parents to do relaxation exercises during the pandemic.	57	43	42	36	22	2.61±1.36
Q14- I had my parents to do aerobic exercise (e.g. dancing, step) at home during the pandemic.	71	38	36	28	27	2.51±1.44

Table 5. Response Percentages According to the Form Prepared with Likert Scale.

Completely disagree		Disagree		No idea		Agree		Completely Agree	
Item	Frequency (%)	Item	Frequency (%)	Item	Frequency (%)	Item	Frequency (%)	Item	Frequency (%)
Q-08	104 (52)	Q-06	53 (26.5)	Q-03	68 (34)	P05	67(33.5)	P02	131 (66.5)
Q-14	71(35.5)	Q-07	53 (26.5)	Q-05	59(29.5)	P03	62 (31)	P01	85 (42.5)
Q-12	64 (32)	Q-08	52 (26)	Q-06	54 (27)	P04	53(26.5)	P04	72 (36)
Q-06	63(31.5)	Q-09	46 (23)	Q-11	54 (27)	P01	43(21.5)	P03	55 (27.5)
Q-13	57(28.5)	Q-10	43 (21.5)	Q-09	52 (26)	P02	38 (19)	P05	46 (23)
Q-07	53(26.5)	Q-11	43 (21.5)	Q-04	51(25.5)	P11	37(18.5)	P10	32 (16)
Q-11	53(26.5)	Q-12	38 (19)	Q-07	50 (25)	P12	37(18.5)	P14	27 (13.5)
Q-10	48 (24)	Q-13	34 (17)	Q-01	44 (22)	P13	36 (18)	P09	26 (13)
Q-09	46 (23)	Q-14	32 (16)	Q-12	44 (22)	P10	35(17.5)	P12	23 (11.5)
Q-04	8 (4)	Q-15	22 (11)	Q-10	42 (21)	P09	30 (15)	P11	22 (11)
Q-01	7 (3.5)	Q-16	21 (10.5)	Q-13	42 (21)	P14	28 (14)	P13	22 (11)
Q-05	6 (3)	Q-17	16 (8)	P14	36 (18)	P07	24 (12)	P07	20 (10)
Q-03	5 (2.5)	Q-18	10 (5)	P08	31(15.5)	P06	16 (8)	P06	14 (7)
Q-02	3 (1.5)	Q-19	5 (2.5)	P02	23(11.5)	P08	9 (4.5)	P08	4 (2)

4. DISCUSSION

University students faced physical restrictions and psychological stress due to social isolation and remote learning imposed during the COVID-19 pandemic which affected countries all over the world. Our study aimed to investigate awareness, the physical activity level, sleep quality, depression severity and life satisfaction of university students during the COVID-19 outbreak. The findings of the current study will hopefully contribute to the literature and improvement of public health in a time of pandemic in which individuals spend longer time at home, go through a multitude of emotional changes, the education model changed (e-learning, online and distance education) and experience reduced physical activity.

Since the pandemic and the new normalization process, which has an impact all over the world, has not been experienced before, there is no measurement tool for the evaluation of this period. Our study makes a significant contribution to the literature with this aspect. With the semi-structured scale developed, university students' level of self awareness about physical activity level and sleep quality was revealed. In our study, some gender-based differences were observed in the responses of the students to the

questions asked about the pandemic. Female students longer seating times than male students. On the other hand, female students said that they spend more time sitting and exercise less frequently. According to the study parameters evaluated, it was observed that female students were more depressed, less satisfied with their lives, had poor sleep quality and exercised less than male students. We think that this may be related to the fact that female students are more adversely affected by the pandemic.

Regular physical activity increases learning motivation and cognitive success. (Huéscar Hernández et al.,2020) In this context, the time allocated to physical activity is very important in order for e-learning, which comes into our lives with new normalization, to be effective the increased sitting time during e-learning with physical activity. However, looking at the results of the scale directed to the students, it is observed that sitting times increased, but their physical activity levels did not increase at the same rate.

The profound positive effects of exercise on immunity justify the current suggested physical activity during COVID-19. (Ranasinghe et al., 2020) In the other hand, direct influence on immunity maintenance to sleep. Circadian rhythm alterations by the COVID-19 pandemic process compromise the quality of sleep and, for that reason, the immune system (De Sousa Martins, E.,2020) Therefore, the awareness of university students about the physical, social and cognitive effects of pyhsical activity should be increased.

In the literature, a study conducted in China, revealed that fear and uncertainty caused by COVID-19 increased the level of depression (Wang et al., 2020). Studies have emphasized that maintaining the physical activity level by exercising on a regular basis in pandemic period is important for relaxation and coping with stress (Rastegar Kazerooni et al., 2020). At the same time, attention was drawn to the use of exercise as a coping method to protect both physical and psychological health (Holmes et al., 2020). In our study, students who exercised in accordance with the literature found a lower level of depression. This is an indication that students stayed away from depression by doing exercises which helped them to cope with stress.

According to the literature, sleep and circadian rhythm disturbances are also directly related to depression.(Batterham et al., 2020, Byrne et al., 2019, Franzen et al., 2017). Consistently, sleep and circadian rhythm were found to be disturbed in university students in our study, in correlation with increased depression levels. We think that this is associated with increased time at home, uncertainty, fear of illness and anxiety for the future. Therefore, we believe that it is essential to take measures to address physical and psychological effects associated with the uncertainty about the duration of social isolation in a time of pandemic and to raise awareness in the community towards increasing physical activity level of individuals.

Economic concerns are among the factors that can cause deterioration of mental health during the pandemic (Williams et al., 2020). The universe of our study consisted of all students of the physiotherapy and rehabilitation department. However, 4th grade students showed more interest and provided more feedback compared to other students. Increased levels of depression of students can be regarded as a reflection of their professional and economic concerns about the future. Therefore, the awareness of university students about the physical, social and cognitive effects of pyhsical activity should be increased. Studies on coping techniques with COVID-19 highlight the importance of home exercises. WHO recommends at least 150 minutes of exercise a week, preferably at a moderate- and high-intensity (Ferreira et al., 2018, WHO, 2010).

In our study, it was found that students who devoted more time to exercise during the pandemic preferred doing moderate- and high- intensity exercises. A regular exercise program is crucial for protecting physical and mental health. In this context, a personalized exercise program can be created by physiotherapists and individual can learn his or her exercises and continue under the supervision of the physiotherapist. We believe that this is very important to maintain public health.

Many studies conducted during the COVID-19 outbreak have shown that exercise also increases life satisfaction (Zhang et al., 2020). It has been demonstrated that increased exercise time during the day increases life satisfaction (Zhang et al., 2020) In our study, when the exercise patterns, exercise awareness, exercise levels and life satisfaction of the students were examined, it was seen that life satisfaction increased as they devoted more time to exercise. Once again, this clearly indicates that long-term adherence to personalized

exercise programs is important in these days when there are various restrictions due to COVID-19.

In the studies that are included the students, questionnaires that can be scored with Likert's scale are frequently preferred (Croasmun and Ostrom, 2011). In our study, the effects of the pandemic process were evaluated with the semi structure 5-Likert scale with non-standard instrument. In the direction of the answers given to the questions created with Likert scale in the Covid 19 process, it was observed that the sitting periods increased in the pandemic process. It was determined that the students have low intensity exercise habits at home and they want to exercise with their families is low. It has been determined that students who done exercise that preferred relaxation exercises. Uncertainty and anxiety caused by the pandemic process are thought to increase the want to relax. Also, relaxation exercises may be preferred because they contain less physical activity and cause less fatigue. The students stated that they learned new things in this process. It was thought that the curiosity and interest in the developing and changing world with increasing leisure time during the day would cause this.

Certain limitations of our study deserve acknowledgment. First, in our study, the all universe could not be reached due to the difficulties of students accessing the internet. Nevertheless, the physical activity and depression levels, sleep patterns and life satisfaction of the students before the Covid-19 process are unknown. The consistency between the answers given to Q2 (I spent more time sitting during the pandemic) and Q8 (I spent less time sitting during the pandemic.) in the questions we prepared in the awareness questionnaire important. In this context, the students agreed that the time spent sitting increased. On the other hand, the consistency of their answers to the Q6 (My physical activity level increased during the pandemic) and Q7 (The time I spent doing sports increased during the pandemic) are an important result for this study. It reveals student's awareness of their physical activity and exercise levels.

Looking at the overall of our study, it was observed that with Covid-19, student's physical activity levels and life satisfaction decreased, as well as increased depression severity and impaired circadian rhythms during this process, where education was frequently continued as online / distance education. Two of these nested parameters directional interaction also draws attention. Therefore, protection of physical and mental health could be provide by increased self-awareness. Increased self-awareness in the students, increasing physical activity levels and it related parameters sleep quality, depression severity and life satisfaction, will improve. The individual exercise programs support that increased self-awareness on students. Individual exercise programs will be especially importance social isolation continues and on the days when students continue their education by distance education / online.

Conflicts of interest

All authors have no conflicts of interest with respect to the data collected and procedures used within this study. Authors declare that they have no sponsor in the study design, collection, analysis, interpretation of data, writing of the manuscript, and decision to submit the manuscript for publication.

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RESEARCH ARTICLE

Evaluation of Fatigue, Sleep Quality and Activities of Daily Living in Patients with Chronic Renal Failure

Sema ÖZBERK[1] and Deniz KOCAMAZ*[2]

[1] Dokuz Eylül University, Health Sciences Institute, İzmir, TURKEY
[2]Hasan Kalyoncu University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Gaziantep, TURKEY
*Corresponding author: denizerdan@gmail.com

Abstract

Introduction: Patients receiving hemodialysis treatment for chronic renal failure (CRF) develop various symptoms and experience lifestyle changes. CRF is a progressive disease characterized by irreversible loss of nephrons. **Objective**: The aim of the study was to evaluate fatigue, sleep quality and activities of daily living in patients with chronic renal failure. **Method**: This was a descriptive cross-sectional study. Sixty-seven CRF patients aged over 18 years who admitted to a private dialysis center for hemodialysis treatment were included. Sociodemographic information was recorded and the 'Visual Analog Scale for Fatigue' was used to evaluate fatigue, the 'Pittsburgh Sleep Quality Index' for assessment of sleep quality and the 'Katz Activities of Daily Living Scale' for evaluation of activities of daily living for all patients. All evaluations were conducted by the same investigator before hemodialysis session. Fatigue level assessment was repeated after hemodialysis session. The data obtained were analyzed using the SPSS 24.0 software package. **Results:** Thirty (44.8%) females and 37 (55.2%) males were enrolled in the study. The mean age of the study population was 55.8 ± 15.75 years. 74.6% of the patients had poor sleep quality. The mean fatigue score of the patients was 4.82 ± 2.02 before hemodialysis and 8.79±1.67 after hemodialysis, as assessed by Visual Analog Scale for Fatigue. All participants were independent in activities of daily living. The average of Katz Activities of Daily Living Scale was 17.03±0.57. **Conclusion**: In line with former studies, fatigue was the most common symptom in the study patients undergoing hemodialysis treatment for chronic renal failure. Additionally, poor sleep quality and reduced performance in the activities of daily living in the study participants are noteworthy. Hemodialysis causes a number of symptoms that patients have to cope with in their daily lives. It is important to guide patients about individualized rehabilitation programs in the treatment of chronic renal failure.

Keywords
Fatigue; Hemodialysis; Sleep quality; Activities of daily living; Rehabilitation

1. INTRODUCTION

Chronic renal failure (CRF) is a public health concern which not only affects the medical condition but also social, economic and psychological state of the patients. Thus, it is of utmost importance to slow the disease progression and treat complications (Noel and Rieu, 2012; Tığlı and Yakut, 2020).

Chronic renal failure is defined as a reduced glomerular filtration rate or the presence of proteinuria. Diabetic nephropathy and hypertensive kidney damage account for the majority of cases. Before initiation of treatment, it should be considered whether causal treatment of the underlying disease is possible and indicated. While specific treatment is not possible in all patients, therapy should aim at reducing progression of renal failure. CRF tend to be associated with intrinsic deterioration that persists after cessation of the causative damaging pathological mechanism. Renal failure progression

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[1]**ORCID**: 0000-0002-6248-9126, [2]**ORCID**: 0000-0002-0611-7686
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can be delayed and the most important measures include strict blood pressure control, reduction of proteinuria and preventing further renal injury (Girndt, 2017). CRF patients may have important loss of daily life activities (DLA) during hemodialysis. Sarcopenia with consequent muscle weakness, immobilization on upper extremity and Local factors, such as the arteriovenous (A-V) may cause that falling of DLA (Fonseca et al., 2020).

In Turkey, hemodialysis therapy is administered in two or three sessions per week at a dialysis unit, depending on the prognosis of the disease. Each treatment session usually lasts for three to four hours. Throughout the session, patients are maintained in the supine or recumbent position. Fatigue is one of the most common debilitating symptoms that occur as a side effect of long-term dialysis treatment and physical inactivity during this process (Tuna et al., 2018). Fatigue has a substantial effect on patients' health-related quality of life. Daytime sleepiness resulting from poor sleep quality also contributes to fatigue. Moreover, activities of daily living are also affected in patients undergoing hemodialysis, which is associated with impaired quality of life. Possible interventions to minimize fatigue in patients receiving long-term dialysis treatment should aim at improving awareness among healthcare providers, developing improved methods of measurements, better understanding of the pathogenesis and management of established contributing factors (Jhamb et al., 2008).

Further studies are warranted to demonstrate the impact of side effects of hemodialysis treatment and individual's skills to cope with the disease on the activities of daily living. The present study was designed to evaluate fatigue, sleep quality and activities of daily living in CRF patients undergoing hemodialysis treatment.

2. METHODS

This was a descriptive cross-sectional study. The study data were collected from November 2018 to December 2019. Sixty-seven CRF patients who admitted to a private dialysis center in the city of Gaziantep for hemodialysis treatment and met inclusion criteria were included in the study. Fully oriented, conscious patients aged over 18 years without communication difficulties who received hemodialysis treatment at least twice weekly for 6 months or longer were eligible for the study. Patients were excluded from the study if they (1) were prior neurological, rheumatologically and orthopedic upper limb problems (2) patients who have had surgery of upper limbs, (3) with diabetes mellitus and (4) patients doing hemodialysis through catheter were also excluded.

For collecting the study data, a patient identification form addressing the sociodemographic characteristics of patients developed by the study investigators based on relevant literature was used. Assessments for the study were conducted using the Visual Analog Scale for Fatigue (VAS-F) for fatigue, the Pittsburgh Sleep Quality Index (PSQI) for sleep quality and the Katz Activities of Daily Living Scale (Katz-ADL) for activities of daily living. All assessments were performed by the same investigator prior to hemodialysis session. Fatigue level assessment was repeated after hemodialysis session.

Visual Analog Scale for Fatigue (VAS-F)

This scale was developed by Lee et al. and consists of 18 items. A Turkish version of the VAS-F is used for assessment of fatigue in hemodialysis patients and its reliability and validity were demonstrated by Yurtsever and colleagues. The scale is a 10-cm line and possible score ranges from 0 to 10. The items 1, 2, 3, 4, 5, 11, 12, 13,14, 15, 16, 17 and 18 are related to the fatigue subscale and items 6, 7, 8, 9 and 10 are related to the energy subscale. The most positive response is scored 0 point and the most negative response is scored 10 points in the fatigue subscale, whereas the most negative response is scored 0 point and the most positive response is scored 10 points in the energy subscale (Lee et al., 1991; Yurtsever and Bedük, 2003).

Pittsburgh Sleep Quality Index (PSQI)

The PSQI consists of a total of 24 questions and 7 components and reliability and validity of a Turkish version of the scale was demonstrated by Ağargün et al. The PSQI is a self-rated questionnaire that is used for screening and assessment purposes. It provides detailed information on sleep quality and type and severity of sleep disturbance over a 1-month time interval. Scoring is based on 19 items and 7 components. Each item is assigned a score between 0 and 3 and the global PSQI score is calculated by totaling the

7 component scores. An overall score ranges from 0 to 21 and a higher total score indicates worse sleep quality. A total PSQI score of 5 or greater denotes "bad sleep" and a score less than 5 indicates "good sleep" (Ağargün et al., 1996).

Katz Activities of Daily Living Scale

The Katz-ADL scale consists of six questions that address bathing, dressing, toileting, transferring, continence and feeding activities. Individuals are scored yes/no for independence in each of the six functions. A score of 3 means the person is independent, a score 2 indicates that the person requires assistance and a score of 1 denotes that the person cannot perform ADLs at all. Based on the scale scores, patients scored 0-6 points were considered as "dependent", patients scored 7-12 points as "semi-dependent" and patients scored 13-18 points as "independent" (Aydın et al., 2009; Tel H et al., 2006).

The data obtained were analyzed using the SPSS 24.0 software package. Results were summarized as means and standard deviations. Descriptive statistics were presented as means and percentages. The Kolmogorov-Smirnov test was used to check the normality of data distribution. Sociodemographic and clinical characteristics of the groups were compared using the Student's t-test. Correlations among variables were assessed using Spearman analyses. The significance level was set at $p < 0.05$ for all analyses.

3. RESULTS

The study sample had a mean age of 55.8±15.75 years and consisted of 30 (44.8%) females and 37 (55.2%) males. Sociodemographic and clinical characteristics of the patients are shown in Table 1.

Table 1. Sociodemographic and Clinical Characteristics of the Patients by Gender

	Female (n=30)	**Male** (n=37)	**Total** (n=67)	**p**
Age, years (X±SD)	49.93±18.22	55.13±13.22	55.8±15.75	0.181
min-max	18-75	19-74	18-75	
Time from initiation of HD treatment, months (X±SD)	40.04±43.07	53.64±47.22	47.55±45.58	0.227
min-max	6-192	7-192	6-192	
Hemodialysis frequency, n (%)				
2 sessions per week	5(16)	3(1)	8(12)	**0.034**
3 sessions per week	25(84)	34(99)	59(88)	
VAS-F score, before HD (X±SD)	5.36±1.82	4.37±2.09	4.82±2.02	**0.047**
min-max	1-8	1-8	1-8	
VAS-F score, after HD (X±SD	8.73±1.83	8.83±1.55	8.79±1.67	0.802
min-max	1-10	2-10	1-10	
PSQI score (X±SD)	9.70±4.54	8.05±4.89	8.79±4.77	0.163
min-max	0-15	0-16	0-16	
ADL score (X±SD)	17.27±0.45	16.45±0,60	17.03±0.57	0.437
min-max	17-18	16-18	16-18	
(Independent (13-18 points)				

HD: Hemodialysis, VAS-F: Visual Analog Scale for Fatigue, PSQI: Pittsburgh Sleep Quality Index, ADL: Katz Activities of Daily Living Scale

Increased level of fatigue was observed in patients after hemodialysis treatment and 74.6% of the patients had poor sleep quality. However, no difference was found in activities of daily living and independence level among patients in relation to CRF.

The mean VAS-F score of the patients was 4.82±2.02 before hemodialysis and 8.79±1.67 after hemodialysis. All patients were independently functioning during activities of daily living with a mean Katz-ADL score of 17.03±0.57 (Table 1).

Fatigue level was greater in females before treatment, while it was greater in males after treatment, as assessed by VAS-F. Female patients had worse sleep quality than male patients. Katz-ADL scores were lower among male patients.

Table 2 shows data on the relations among fatigue, sleep quality and activities of daily living before hemodialysis session in patients undergoing hemodialysis treatment 2 to 3 times weekly.

Table 2. Relations Among Fatigue, Sleep Quality and Activities of Daily Living

	Fatigue	**Sleep quality**	**ADL**
Fatigue		r=0.201 **p<0.011**	r=0.149 **p< 0.034**
Sleep quality			r= 0.128 p>0.082

ADL: Katz Activities of Daily Living Scale

Fatigue showed a weak significant association with both sleep quality and activities of daily living. Determinants of fatigue level were given on Table 3.

Table 3. Determinants of fatigue level

	Unstandardized Coefficients				
	B	**Std. Error**	**Beta**	**t**	**p**
Age	,030	,016	,236	1,880	,065
Hemodialysis sessions	-,014	,065	-,025	-,208	,836
Gender	-1,179	,510	-,291	-2,310	**,024**
PSQI	-,029	,054	-,068	-,536	,594

PSQI: Pittsburgh Sleep Quality Index

4. DISCUSSION AND CONCLUSION

Hemodialysis patients experience fatigue due to various reasons such as accumulation of metabolic waste in the body, fluid-electrolyte imbalances, abnormal energy expenditure, anemia and depression (Yurtsever and Bedük, 2003; Merlino and Gigli, 2008). Sense of tiredness may persist even after rest (Jhamb et al., 2008; Solak et al., 2011). Fatigue symptom is commonly reported in studies and occurs before and after dialysis. Feelings of exhaustion cause lack of motivation and reduced physical activity in individuals (Aucella et al., 2014; Delgado and Johansen, 2011). Pre- and post-treatment assessments performed in the current study yielded findings that are consistent with the literature. The finding of increased fatigue severity after the treatment is noteworthy.

Sleep disturbances are prevalent among patients with CRF (Liaveri et al., 2017). In researches, it was stated that sleep quality may be adversely affected through several mechanisms including excessive daytime sleepiness and increased inflammatory cytokines in individuals undergoing hemodialysis treatment (Chen et al., 2011; İnal, 2019). In a study which examined sleep quality in patients on hemodialysis treatment, poor sleep quality was reported in 73% of the participants (Čengić et al., 2012). Similarly, the majority of the patients were found to have poor sleep quality in the current study.

Individualized rehabilitation programs have been demonstrated to be effective in minimizing sleep problems associated with chronic diseases (Kocamaz, and Düger, 2020; Ozberk et al., 2020). Low-intensity aerobic exercises performed 3 times a week for 30-45 minutes were reported to

improve sleep quality in hemodialysis patients (Yurtkuran, 2007). An important finding of the current study is the high number of patients with poor sleep quality. Further studies are needed to examine both the short- and long- term effectiveness of personalized rehabilitation programs in individuals with chronic renal failure.

Chronic diseases cause functional limitations by substantially disrupting the daily lives of individuals (Yazıcı and Kalaycı, 2015). In the International Dialysis Outcomes and Practice Patterns Study (DOPPS), the percentage of patients who could perform each activity of daily living without assistance ranged from 47% (doing housework) to 97% (eating), generally depending on the age of the individual (Matsuzawa et al., 2014; Jassal et al., 2016; Yoda et al., 2012; Aydın, 2018). The mean age of our patients and their independence in ADLsare in line with those reported in the literature. The Katz Activities of Daily Living questionnaire was used in the current study and all participants were considered independent based on their scores. It is our belief that the absence of a structured tool specific to CRF patients hinders the ability to assess activities of daily living and quality of life in these individuals. Thus, assessment tools that address the changes in activities of daily living in individuals before and after the treatment session and examine their professional and social activities in detail should be developed to fill this gap.

Consistent with literature, fatigue occurred as a common symptom before and after dialysis sessions in patients undergoing hemodialysis treatment for chronic renal failure. Additionally, poor sleep quality and reduced performance in the activities of daily living in the study participants are noteworthy. Hemodialysis causes a number of symptoms that patients have to cope with in their daily lives. In our study, in accordance with the results of the literature, it was observed that the symptoms of fatigue were more common in women before hemodialysis (Bonner et, al. 2010).

Limitations to this study is its cross-sectional design and the small number of the sample. The inclusion exclusion criteria of patients were difficult as diabetic neuropathy.

Concluding, we found that CRF patients on hemodialysis have impairment of daily life activity. Decreased fatigue may help to improve increased sleep quality for these patients. It is important to guide patients about individualized rehabilitation programs and maintain their physical activity level during CRF treatment. We believe that future studies on physical therapy and rehabilitation in this area would greatly contribute to the management of chronic renal failure.

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LETTER TO THE EDİTOR

Telerehabilitation During the COVID-19 Pandemic: Why and How?

Fatih ÖZDEN[1]

[1] Muğla Sıtkı Koçman University, Department of Elderly Care, Köyceğiz, Muğla, Turkey
*Corresponding author: fatihozden@mu.edu.tr

Dear Editor

Along with the COVID-19 pandemic, government officials in many countries where the novel coronavirus is spread to have taken the necessary steps to keep their health systems under control (Tanne et al., 2020). A challenging process has begun for patients in countries or in certain zones of some regions where the pandemic has a high rate of spread that need rehabilitation services throughout long-term and comprehensive quarantine measures. All practices carried out to limit social distance have been an important measure for the safety of both the public and healthcare professionals (Prin & Bartels, 2020). Within the scope of these measures, continuity is provided in remote health services within the health community. The World Confederation for Physical Therapy (WCPT) has made suggestions to continue the physiotherapy and rehabilitation services only with urgent treatments and to disseminate telerehabilitation practices for the safety of member countries. Many health organizations affiliated with WCPT have already expanded their existing telerehabilitation practices with guidelines and recommendations. One of them, the American Physical Therapy Association, has published a resource that provides telehealth guidelines. In some countries, healthcare policies have been revised for new remote healthcare technologies that can be used nationally (Turolla et al., 2020).

It is already known that telerehabilitation provides advantages in terms of cost, time, and transportation (Ruiz-Fernandez et al., 2014). Telerehabilitation during COVID-19 is important for these three main reasons. First of all, it is known that telerehabilitation prevents loss of time in health services. It shows that in some countries, employment was increased due to the growing need for healthcare professionals during the pandemic period, the healthcare professional was not sufficient and the staff had time-related problems (Lewis et al., 2020). Secondly, the health expenditures increased during the coronavirus pandemic (Moazzami et al., 2020). In cost-effectiveness analysis studies of telerehabilitation, it is mostly proven that remote treatment methods are less costly (Shenoy, 2018). Thirdly, even in urban areas where transportation is easy, difficulties occur due to quarantine (Ruiz-Fernandez et al., 2014). Remote patient monitoring and rehabilitation applications will also help to minimize this problem.

Telerehabilitation practices and related clinical studies have been increasing in recent years. However, software and hardware used in telerehabilitation are mostly used in clinical practices and trials without analyzing the usability and validity. On the other hand, it is recommended to validate a newly developed system and to use it for clinical purposes after test-retest reliability has been proved (Fazel-Rezai, 2011).

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[1]**ORCID**: 0000-0001-6593-3758

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In this way, in order to meet the demand for remote rehabilitation, which intensifies during the pandemic period, without delay, it can be ensured that infrastructure is prepared in advance regarding technical problems, and if necessary, alternative plan and risk management are prepared.

Another important issue is the ethical requirements and principles. During the COVID-19, inappropriate software that are not prepared in accordance with ethical principles can pose essential problems for the protection of personal data (Ekong et al., 2020). Protecting patient privacy is challenging due to the lack of legal provisions applicable to international standards on telerehabilitation ethics. An informed consent form should be signed for remote therapy services. The security of data collected through telerehabilitation is never guaranteed due to the medical data leaked by hackers and third-party applications (Özden & Lembarki, 2020).

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