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Impact of the wheelchair in the development of upper body specific muscle training among students Ectomorph

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Abstract. Ectomorph's body is fragile, with long, slender, poorly muscled extremities and delicate bones. Through this problem, PE teacher must alter its expectations drew upon the changes in body shapes in the early stage of growth. Indeed, in similar as disabling defects due to the lack of general muscular strength via ectomorph body shape. For this proposal, we emphasized the experimental method, including 40 males' ectomorph students, chosen by the intentional method. Divided into two groups (Experiment (ES), control (CS)) based on upper body muscular disabilities, during the 2016/2017 school year, at Zagllole secondary school, Mostaganem academic. To test our hypothesis, we focused on two training programs traditional with weight (CS) vs Wheelchair (ES) as tools to strengthen upper body musculature, within 6-weeks under researchers' supervision, integrate as 15 minutes of warm-up during basketball cycle in the second semester. Whereas to evaluate their progress, we based on press up test and multiple-RM assessments (Pectoral (Pecs) - Deltoids (Delts) - Latissimus Dorsi (lats) - Biceps- Triceps- Abdominals (Abs)). In the beginning and at the end of the program basketball cycle. Based on statistical applied, we confirmed that the integration of the wheelchair as a strength tool improves the general muscular strength via ectomorph body shape better than the traditional. The wheelchair is a benefited tool muscle training that improves the muscle building, muscle strength and muscle endurance via ectomorph body shape better than the traditional method. Interpret in similar studies via manual wheelchair frames and components as manufactured materials having high strength-to-weight ratios. Finally, we approved in the case of this study that few wheelchair rounds around the gym is enough to improve strength in any strength program.

Keywords. Ectomorph students, upper body musculature, wheelchair.

Introduction

There is now fascinating evidence that increased levels of physical activity can bring wide-ranging health benefits that impact upon the population. Where these benefits can prolong outside physical health to comprise other benefits, such as mental health, personal well-being, and social cohesion. The case of School-based programs can play an important role in promoting healthy long life with a disability.

Support through the literature that sport and exercise can contribute to increasing both physical and psychological health problems via these people while Education Physical and Sport (PE) are important indicators of productivity for the general population. Although no studies have reported that the use of wheelchairs in PE sessions is used and effects in the development of upper body musculature. The opposite of the principle that simple muscle stretching techniques are not effective (Page, 2012).

It has been confirmed by rehabilitation studies that the use of a wheelchair to develop strengthening is a beneficial method to correct imbalances of the muscles in the upper extremity.

From the above advantages in comparison with ectomorphs body type disability in physique correlate with height and weight (Galligan et al., 2002), as underdeveloped bodies with little muscle and fat (Jane Johnston & Nahmad-Williams, 2014), via this population. Despite that this disability can limit their physical activity (Ozmen et al., 2014). The

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case of our sample record in underweight for its height, according to Guerrero et al. (2006). Appropriate in similar studies, as global objectives integrate into their program, which must include all the effects of mass distribution, linear accelerations and angular accelerations of the work object and body movement (Ursino, 2005). It also has been presumed by the research team in the use of the wheelchair as a training means in education sports activities or reliability has seen a development in muscle strength, cardiorespiratory endurance and bone mineral density according to previous studies. Since their use requires a high level of conditioning to maintain work intensity and to prevent injury (Goosey-Tolfrey, 2010).

It was documented by a similar training program that wheelchair as a tool can improve the five major motor abilities, which are endurance, flexibility, coordination, strength, and speed (Skucas, 2012) which guided us to consider it as a training tool that can develop upper body musculature among ectomorph students whom are cited in the literature as a body type, fragile, with long, slender, poorly muscled extremities and delicate bones.

From the above, our intervention in this study is to incorporate the wheelchairs in the EPS sessions, as 15 minutes of warm-up, during the basketball cycle as tools for the experimental group (ES).

For 6-weeks we have compared (ES) with the control sample (CG) which program is based on the traditional method in which all warm-up exercises were built on body weight. Whereas to test the impact of the two programs we used the relationship between Press up Test and multiple-RM assessments tests (Repetition Maximum with Fix Load 10 KG) which has been defined in similar studies as multi-tests involved multiple planes and multiple joints (Pectoral (pics) - Deltoids (Delts) - Latissimus Dorsi (Lats) - Biceps- Triceps-Abdominals (ABS) (Mangine et al., 2015).

Materials & Methods

Methodology

Researchers used the experimental method by choosing two groups, homogeneous into their disabilities, recorded in Upper body musculature below average, age (17.54±1.22), BMI (underweight). Table 1 presents the data as the Mean ± SD for the two groups (ES and CS).

Participants

Forty students physically active in EPS sessions, Secondary School of Zagllole, Academy Mostaganem participated in this study. Their inability Upper Body Musculature were calculated based on Golding et al normative data for the Push-ups for Men (17-19 years) set by Nieman (2006). As well as underweight (BMI < 18.5), admit by Ferraro et al. (2002) as manifested higher disability in most instances. See Table 2.

Table 1.
Presents the characteristics through the purpose test used in the present study via pre-test.

Variables		N	Mean ± SD	Shapiro-Wilk		Levene's		t-test	
				Value	p	F	p	t	p
BMI	ES	20	18.26±1.06	0.92	0.15	0.25	0.62	0.09	0.92
	CS	20	18.22±1.042	0.97	0.09				
PecsT1	ES	20	35.60±0.99	0.87	0.25	0.96	0.33	0.36	0.72
	CS	20	35.70±0.73	0.78	0.28				
LatsT1	ES	20	20.15±1.72	0.95	0.17	1.13	0.29	0.21	0.83
	CS	20	20.05±1.23	0.91	0.18				
DeltsT1	ES	20	9.60±0.59	0.67	0.39	0.07	0.80	1.06	0.78
	CS	20	9.40±0.58	0.74	0.29				
BicepsT1	ES	20	15.45±0.94	0.85	0.28	0.38	0.54	0.29	0.68
	CS	20	15.60±1.23	0.86	0.22				
TricepsT1	ES	20	16.10±1.86	0.91	0.19	0.37	0.55	0.43	0.66
	CS	20	16.95±1.76	0.86	0.24				
AbsT1	ES	20	24.15±3.65	0.93	0.19	0.31	0.39	0.11	0.92
	CS	20	24.25±2.86	0.95	0.16				
Press UpT1	ES	20	13.45±1.12	0.86	0.55	1.26	0.268	1.46	0. 87
	CS	20	13.60±0.75	0.68	0.38				

Table 2.
Presents the normative data for the Push Ups for Men (17-19 years) and BMI classification used in the present study.

Press Up Test						
Age	Excellent	Good	Above Average	Average	Below Average	Poor
17 - 19	>56	47-56	35-46	19-34	11-18	<11
Body Mass Index (BMI)						
Classification	BMI (kg/m2)	Sub-classification	BMI (kg/m2			
Underweight	< 18.50	Mild thinness	17.00 - 18.49			

Table 3.
Presents the relationship between Press up Test and multiple 1-RM assessments used in the pre-test (n=40).

		PecsT1	LatsT1	DeltsT1	BicepsT1	TricepsT1	AbsT1	BMI	Sample
PressUpT1	Pearson Correlation	0.322*	0.461**	0.413**	0.401*	0.413**	0.430**	-0.48**	0.44**
	Sig. (2-tailed)	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

While to test our hypotheses we referred to the protocol applied see table 3 in which the relationship between Press up Test and multiple-RM assessments tests (Repetition Maximum with Fix Load 10 KG) which are strongly positive in the opposite of BMI as a strong negative correlation in the pre-test. Decoding by researchers as the inability of ectomorphs body type reported in similar researchers as a disability in physique correlates with height and weight (Galligan et al., 2002), revoked in Upper Body Musculature the case of this study. Approve inhomogeneity of our two groups by the independent T-test set in Table 1. In which our sample accepts normality distribution and homogeneity built on Shapiro-Wilk and Levene's.

Measurement of Disability

Assessment the loss of strength and muscle mass observed with ageing is associated with increased health care costs (Cawthon et al., 2009). Although the Ectomorph body type is fragile, with long, slender, poorly muscled extremities and delicate bones (Burfeind & Bartusch, 2015). Relative to his mass (Schmalleger, 2009). From this establish, our choice guides us to press up tests to assess the strength endurance of upper body muscles based normative data for the push-ups for men provide by Golding et al. (1986) cited in Table 2. For BMI we defined it as weight in kg/ (height in meters) (Mohammed et al., 2017). Whereas to combine their effects on Upper Body Musculature, we used multiple RM to interpret their relationships with Push up Strength view that the upper-body musculature is associated with their maximal muscular (Howley & Thompson, 2017).

Training program

The proposed educating training sessions were held on January 18, 2016, until the end of March 13, 2016, Basketball cycle in the second semester.

After the adaptation of our student to the use of this tool, the researchers applied this training program, which aims to develop upper body musculature base on a wheelchair, the program included three (01) training units in a week of six (06) weeks. 15 minutes of warm-up were consisted of:

- o All warm-up exercise, both fast and long-duration movements' were carried out using the wheelchair. For ES group in the opposite of CS group, without chairs.
- o All warm-up exercises with balloons were carried out using the wheelchair. For ES group in the opposite of CS group without chairs.
- o Warm-up exercises consisted of 6 six exercise stations:
- 5 min running to solicit large muscle groups and cardiorespiratory endurance.

- 10 min Fartlek Training composed of six stations as specific exercises with the ball. See figure 1.

Statistical Analysis

To identify differences between training protocols on changes in upper-body Musculature strength. The analysis data was counted using a statistical program SPSS 20.0 for Windows. The characteristics of the sample (mean and standard deviations) were computed for all variables. Data from pretest (T1) and post-test (T2) were compared with the independent t-test. To associated values collected via strength tests, we used Pearson correlations. Statistical significance was set at $p \leq .05$.

Results

To examine group differences in the acute training program comparable as a second step to determine the effect of tradition with weight (CS) vs wheelchair (ES). Our results show that the use of a wheelchair as tool-specific muscle training improves the muscle building, muscle strength and muscle endurance via students Ectomorph. Approved by similar via high strength-to-weight ratios as an important method to select strength-training exercises (Joyce & Lewindon, 2014). Recommend by ACSM at least 8 to 10 exercises of the various large muscle groups with 8 to 12 repetitions (Bulechek & Dochterman, 1999). As resistance training that has been shown to improve total body strength, according to (Magee et al., 2007), the case of the wheelchair as tool-specific muscle training. Where its user may have greater hypertrophies in response to endurance training, as supplemental strength training, agreeing by (Sisto et al., 2009). It has been approved in the present study by the independent t-test Table 4 the differences between two groups in changes in the effectiveness of muscle strength after 6 weeks of training.

Whereas to estimate the impact of the wheelchair in the development of upper body muscle building among students Ectomorph in the present study, we referred to the relationship between Press up Test and multiple 1-RM assessments used in the post-test. Table 5 presents the benefits of the group with a wheelchair. Where our results are in conformity with the judgment provided by Goosey-Tolfrey (2010) that the use of the wheelchair for every day is an excellent way to build strength and improve movement Upper body. Admit in relation Press Up and development of upper body muscle building positive in pre-test (T1) and strongly negative in post-test (T2) via our two groups. Interpret in similar as result of wheelchair propulsion, shoulder muscles active during the pushing phase are believed to become stronger, whereas the muscles that are involved during the recovery phase remain at the same strength (Ambrosio et al., 2005).

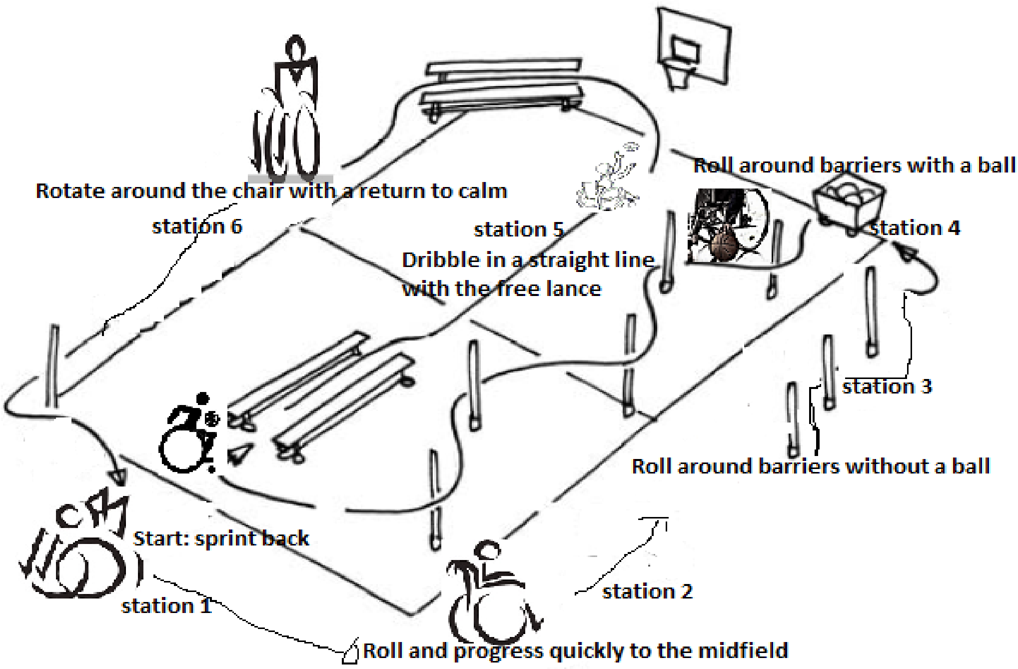

Figure 1. Describes the proposed group of exercises.

Table 4.
Differences between groups in changes in the effectiveness of muscle strength after 6 weeks of training (n=20).

Sample		Mean ± SD	t	p
PecsT2	ES	39.55 ± 2.50	3.27	0.02
	CS	37.4 ± 1.53		
LatsT2	ES	30.75 ± 2.17	2.18	0.03
	CS	29.55 ± 2.33		
DeltsT2	ES	14.6 ± 1.76	8.22	0.00
	CS	12.65 ± 0.67		
BicepsT2	ES	17.25 ± 1.80	2.36	0.02
	CS	16.00 ± 1.58		
TricepsT2	ES	19.95 ± 1.09	5.80	0.00
	CS	18.00 ± 1.02		
AbsT2	ES	28.75 ± 1.65	3.97	0.00
	CS	26.65 ± 1.69		
Press UpT2	ES	19.2 ± 1.32	6.71	0. 00
	CS	13.60 ± 0.75		

Table 5.
Presents the relationship between Press up Test and multiple 1-RM assessments used in the post-test (n=40).

		PecsT2	LatsT2	DeltsT2	BicepsT2	TricepsT2	AbsT2	Sample
Press Up T2	Pearson Correlation	0.66**	0.64**	0.71**	-0.62**	0.68**	0.636**	-0.77**
	p	0.00	0.00	0.00	0.00	0.00	0.00	0.00

** Correlation is significant at the 0.01 level (2-tailed).

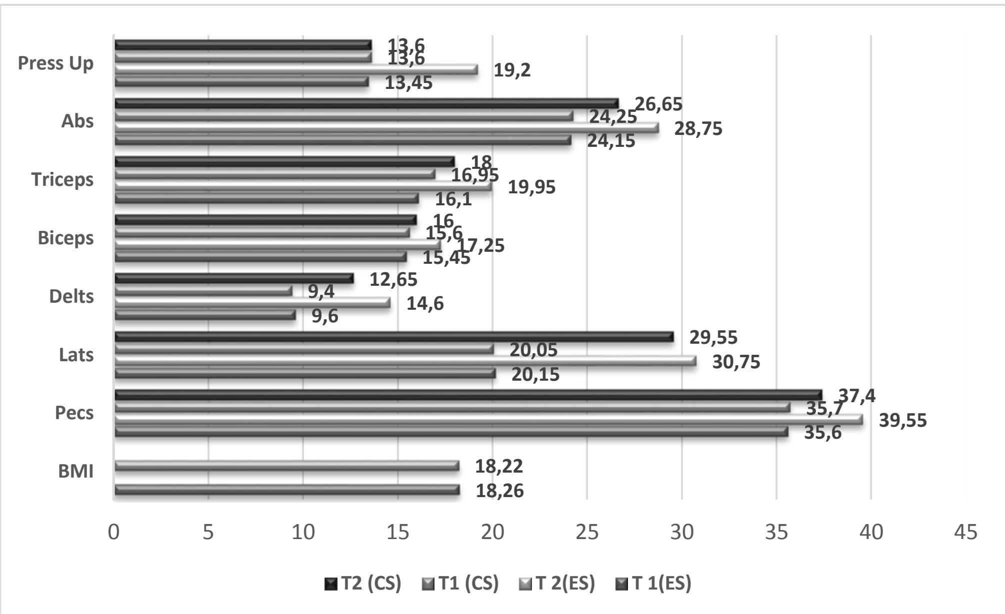

Figure 2. Describes the differences between the two programs in improving the strength of the upper body.

Discussion

The major findings of this study indicated those 6 weeks of the wheelchair as a tool for ES group VS weight for the CS group improved Upper Body musculature among Ectomorph Students more efficacy than *traditional*. See Fig 2. Confirmed by DeLisa, et al. (2005) in power or manual-assist wheelchair as key muscle group that performs wrist extension (extensor carpi radialis). Knowledge by Cifu (2016) manual wheelchair frames and components are manufactured with materials having high strength-to-weight ratios. Admit by Jan Thurman, et al. (2004) a few laps with the wheelchair around the gym will improve your strength program's efficiency (Thurman et al., 2004). Approve in the case of the program within this study by Frankel et al. (2012); including propelling a wheelchair safely, without bumping into other people or objects, is so good to do push-ups with the upper body. Deduce by Connolly & Montgomery (2004) in the increase of strength in all active muscle groups, especially the flexors and extensors of the trunk as well as its shoulder. To conclude our experience this topic guided us to agree that Ectomorph body type needs to develop strength and endurance in the muscles of their arm, according to a wheelchair as a tool-specific training to develop their upper body (Pountney & Pountney, 2007). Established by Hong (2013) in the approaches through a training program that the coaches or educator must take into account the wheelchair as a tool which increases the muscular strength, power and/or range of motion as well as any changes in inter-segment coordination. Reported by Parry & Steinberg (2007) as exercises, including weightlifting may be used to improve upper limb strength and eventually allows the patient to transfer independently from a wheelchair. However, the Ectomorph Students progresses in height which is not correlated with ideal weight. We agree that Wheelchair as a tool should be considered early to facilitate mobility for those people (Alexander et al., 2015). Especially for students who feel pain from the decreased weight. Since this disability can limit their physical activity (Ozmen et al., 2014). The case of the Ectomorph body type which is fragile, with long, slender, poorly muscled extremities and delicate bones, relative to his mass that is not adequate with its weight (Mutchnick et al., 2009).

Conclusions

In conclusion, the results of this study indicate that PE teacher must alter his expectations drew upon the changes in body shapes in the early stage of growth. Indeed, in similar as disabling defects due to the lack of general muscular strength via ectomorph body shape. Supported by the research team in the benefit of its training program that can improve the five major motor abilities, which are endurance, flexibility, coordination, strength, and speed (Skucas, 2012).

It has been reported from the results that the use of the wheelchair as a training means in education sports activities or reliability develop muscle strength, cardiorespiratory endurance and bone mineral density agreeing to previous studies (Ozmen et al., 2014). Admit by the present study in the intentional intensity that requires via the ectomorph body shape a high level of conditioning to maintain work intensity and to prevent injury (Goosey-Tolfrey, 2010) among Upper Body Musculature. Although our results are in conformity with the similarities, which describe it because of the use of wheelchair propulsion, shoulder muscles active during the pushing phase are believed to become stronger. Whereas the muscles that are involved during the recovery phase remain at the same strength (Ambrosio et al., 2005).

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