



RESEARCH PAPER

Effects of Strength Training on the Physical Fitness and Obesity of College Girls

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ABSTRACT

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The purpose of this study was to examine the influence of strength training on physical fitness and body composition of college girl's students of District Peshawar. The selected participants were (N=70) girls' students of Govt Frontier College for Women, Peshawar. Eight weeks training schedule was adopted, (five days in a week) which comprises of different physical activities such as 30m race, 400m race, sit ups, skipping, matches of badminton and volley ball. A paired t-test was applied to examine the effect of training on body composition and physical fitness of college girls. Result showed that strength training significantly effects on bicep skin fold ($P>0.01$), hip girth ($P>0.05$), chest girth ($P>0.04$), 30m race ($P>0.08$), and flexibility ($P>0.04$). It is concluded that strength training increases the physical fitness and reduces body fats of college girls and enhances the general strength of participated college girls.

Introduction

Physical fitness of students in educative intuitions and colleges is directly linked with reduced risks of cardiovascular diseases, heart strokes, metabolic syndromes, diabetes, and all mortality causative issues (Fu, Goa, Hannon, & Shul., 2013). In the last few decades, obesity, and overweight has been increased considerably in teen ages thorough out the world. Now 1/3rd of the population across the globe can be characterized as being obese or overweight, and all symptoms are directed towards a more expansion in the coming years (Caestine, Boop, & Papalia., 2017).

According to World Health Organization (WHO), obesity has become one of the most well-known medical conditions in students which is characterized by extra body fat accumulation to the extent that it might impose a negative consequence on health. The constancy of these statistics over a decade indicated that being overweight has become an endemic to Pakistani students (Egli, Bland, & Melton., 2011).

Several studies on obesity have highlighted that a persistent growth in obese people is directly correlated with a reduction in physical activities and extreme intake of nutritional stuff due to the developed industrial technologies (Zheng, Lan, & Yan., 2013). As long as several extensive adverse consequences in the health sector, the obesity epidemic is may be labeled as an obvious public health concern on a global level. The relative significance of the sedentary lifestyle that is the associated factor cannot be denied.

Although health care clinical efforts aimed to encourage teenage students to eat healthy food and do more exercise not a single country has yet succeeded in reversing the prevalence of obesity over the last many years (Zhao, Wei, & Li., 2011). Exercise and physical training regarding guidelines by public health also added marvelous contributions to the level of physical fitness of the students and provided direction and recommendations on the intensity, frequency, and duration of physical activities (Lockwood & Wohl., 2012). For instance, the US Centers for Disease Control and Prevention suggests at least 30 minutes and preferable 60 minutes of exercise in at least 5 days per week for adults of ages between 18 to 64 years for improved health benefits and to get moderate to vigorous physical activity (French & Jeffery., 1994).

Similar recommendations have been published by World Health Organization (WHO) and aimed to decrease the 10% prevalence of insufficient physical activities by 2025 (Weinstock, Capizzi, Weber, & Petry., 2014). During leisure time, the student's activity level seemed to increase gradually and has not enough to counterweigh their higher sedentary lifestyle. When students shift from high school to college, they gain more autonomy compared to their everyday lives (Farren, Zhang, & Thomas., 2017). Epidemiological findings have testified significant reduction in physical activities because of increased independence throughout high school and college level (Gutin, Cucuzzo, & Stachura., 1996).

Moreover, the residency (distance of location on and off campus) and psychosocial life of college students also affects the physical activity as well as correlated mediators like self-efficiency and perceived benefits (Kalinin, Obas, & Lau, 2015). The studies conducted on adolescents are general yet might not deduce to the college population. Ordinary-weight students had 11% higher grades on average as compared to overweight students (Stice, Shaw, & Marti, 2006). Meanwhile, high weight college students had lower scores in reading comprehension and academic outcomes of college students have been directly correlated with aerobic strength levels positively. In spite of these profound shreds of evidence during other life stages, there is very limited research examining how physical fitness, activity, and academic results are correlated throughout the college years (Puhl & Heuer., 2009).

Furthermore, the link between physical fitness and body composition among college students in Pakistan is also not clear and there is a lack of evidence updating college wellness and health policies and programs for physical activities (Downs & Ashton., 2011). Thus, this study is filling the research gap, in the perspective of Pakistan where this research area is lacking. Therefore, there is a need for such a study to examine the bond between accurately measured physical fitness including muscular endurance, flexibility, agility, strength, etc., and anthropometric variables including girth, breadth, skinfold, length, etc. some other factors like height, weight, arm spam, handgrip, and sitting height.

Literature Review

Physical inoperativeness among college students and its relation to keen incidents of diseases including youthful obesity, overweight, diabetes mellitus, and cardiovascular disorders has become a global health concern (Kerner et al., 2001). Approximately half of the young students between 12 to 21 years of age are not strongly active on a consistent basis. Until now physical activity imposes a wealth of advantages such as adiposity, musculoskeletal and mental health to regular participants (Liu, Zillifro, & Nichols, 2012). Health and educational professionals have instinctively believed that students who are physically fit and active perform well in college. A lot of studies have recognized a positive relationship between academic achievements, cognitive performance, and physical fitness measures (Korol, 2014).

In addition, physical activeness has been associated positively with understanding. Apart from the educational settings, consistent grades and testing measures are characteristics of cognitive workings that have also been linked with physical health. Generally, the effects of the training also correlated with higher physical activeness in students have also recorded positive the beneficial impacts of balancing the potential menaces (Eveland-Sayers, Farley, Fuller, Morgan, & Caputo, 2009). The indirect association between activity behavior during childhood and adulthood also limits potentially the occurrence of risk factors regarding cardiovascular disorders in later life. Other intellectual research has recently connected neuroelectric developments and behavioral performances with the aerobic and bodily fitness of students during stimulus insight tasks. The previous findings recommended that higher fit students exhibited better provision of intentional tasks and working memories by the support of cognition and fitness investigations in adult students' populations (Motl et al., 2001). A little but significant association between physical fitness and intellectual performance exists among all college-aged students. The previous findings also exposed that physical fitness might be advantageous to the cognitive health of students with the principal effects on academic and IQ-related achievements (Ujevic, Sporis, Milanovic, Pantelic, & Neljak, 2013).

Anthropometric Measurements

The assessment of shape, size, and composition of the human body is known as anthropometric measurements such as bioelectrical impedance, waist to hip ratio, skinfold, and abdominal and calf circumferences. Anthropometric standards virtually relate to nutrition, environmental features, genetic makeup, cultural and social circumstances, functional status, lifestyle, and health (Bohr et al., 2013). Anthropometric assessment is an important attribute of geriatric nutrition evaluation to determine higher weights, malnutrition, obesity, fat mass gains, muscular mass losses, and redistributions of adipose tissues. The evaluation of the prognosis of acute and chronic diseases is also performed with the help of anthropometric indicators which also guide elderly medical interventions (Bass et al., 2013).

The anthropometric evaluation made by qualified health workers that is being non-invasive and inexpensive that provide comprehensive information on the several body structure components significantly fat and muscular components and consequently helpful in assessing the public nutritional status (Phillips & Young, 2009). The process of aging comprises nutritional and physiological changes which are demonstrated by loss of muscular mass, weight, and height as well as the increase

in fat mass. It also includes a reorganization of adipose tissues with an accumulation of fats in the viscera and trunk (Lambourne et al., 2013). Bodily composition variations differ in males and females at different stages of life and are reflected during anthropometric measurements (Marsh, 1994).

Subsequently, various anthropometric indicators are considered for evaluation of the nutritional status among college students during different times in life. For example, among the patients of hemodialysis, a strong predictor is the weight for height to demonstrate the 12months mortality (Marta et al., 2012). The reason behind this is that the rates of mortalities appear to reduce as the weight for height in the patient increases. Likewise, a lower mortality rate has been recorded in the patients with a high body mass index (BMI) as compared to lower BMI. The correct bodyweight use is crucial for the assessment of patients and to determine their needs for diet and nutrients (Cobo-Cuenca et al., 2019).

Physical Fitness and Activity of Students

According to World Health Organization (WHO), health is not only referred to as the absence of infirmity and disease but also as a state of complete mental, physical, and social comfort. Physical activity is one of the most crucial ways to improve psychological and corporeal features of students' health (Zhen & Mao, 2008). The role of exercise is accepted widely in decreasing premature mortality risks due to multiple diseases (Lambourne et al., 2013). A large number of tentative studies and the presence of various plausible theoretical enlightenments evidently support the role of regular exercise in providing mental health profits (Thompson & Hannon, 2012).

Physical activity is also a very significant aspect of everyday life and frequent studies have inspected the effects that an individual who is being fit and active has professed quality of life. For example, various diseases occur less commonly in individuals who integrate physical activity into their regular practices, efficiently improving health and fitness-related life quality (Beville et al., 2014). Such a concept has been studied across several social groups by observing the influences of physical activity on various life aspects beyond physical health including how physical activeness impressions the psychological health of the students (Lepp et al., 2015).

Physical activity has revealed comparable effects with prescribed antidepressants on depression patients. It is probable to examine levels of physical activeness among students of colleges in order to evaluate whether such activity helps to reduce the stress in the students especially girls or not (Ullrich-French et al., 2011). College students might be more susceptible to less physical activity because of modern life stressors including financial apprehensions, higher demands of academics, and social ambiguities (Mak et al., 2010). College students are the most suitable testing group to study the impacts of exercises and fitness training on life. Being able to support the privilege that physical activity can reduce stress levels would be helpful for anyone who is suffering from external pressures on a regular basis (Caestine et al., 2017).

Benefits of Physical Fitness for College Girls

Exercise has been exposed to several prominent impacts on the holistic health of the students in which they are stimulated to take responsibility personally to

establish a boosted level of comfort in life. The critical and chronic effects of exercise in the reduction of anxiety and depression have been demonstrated clearly. All active aerobic exercises including cycling, jogging, swimming, walking, and aerobic dance as well as weight training are considered non-aerobic exercises. Students with virtuous physical fitness are the goal lines of any healthcare sector (Fair Clough & Stratton, 2005).

The conditions of being healthy and fit are dependent upon respiratory endurance and body composition as well as body weight. This set of components relates to the abilities of individuals to perform physical activities (Parreño-Madrige et al., 2020). If female students can improve all such components, its acquaintances to the improvement like disease prevention, fitness status, and educational scores or performances. Particularly, young adult females between 15 to 24 years of age with the optimum physical fitness lean towards better emotional adjustment and improved academic outcomes (Li et al., 2015).

Youth-engrossed fitness mechanisms mostly have the designs to deliver social comparisons-based or competitive motivations. But like the current study design, the fitness level can easily be judged after training college female students with better fitness techniques (Toscos et al., 2006). The system has been designed to gather the physical fitness data from the college girls and analyze it to create the standards of females regarding physical fitness and to motivate students to enhance their bodily exercises and activities to obtain better physical health. College students could be more cognizant of ways that they can safely manage their stress, and improve their overall health. Similarly, by studying the impact that physical activity has on males versus females (Adyrkhaev, 2016).

Fitness Matters for Students

The cumulative prevalence of obesity and overweight among students has become a global trend and they are at higher risk of experiencing a range of health-related challenges at different intervals of life. Immediate health regarding issues due to obese and overweight among students include; highly psychological dysfunction and especially social isolation (De Marco & Sidney, 1989). The reasons behind it include those young students with overweight have been characterized by few peers as stupid, ugly, lazy, and dishonest and consequently they often experience teasing, bullying, and social isolation. Such students are also at higher risks of co-morbidities as compared to their slim fellows. For instance, students with high weight and obesity are at larger risk of asthma and they are being enforced indirectly to take more medicines of wheeze with the involvement of spontaneous hospital visits and missing more college days (Druz et al., 2017).

In simple words, obesity and overweight among students are more probable to develop different cardiovascular, gastrointestinal, orthopedic, and endocrine issues as compared to their lean fellows who might be exacerbated in the larger terms. Furthermore, obese and overweight female students are more probable to develop abnormalities in a reproductive system like early onset of menarche and puberty as well as polycystic ovary syndromes (Gu et al., 2016). A lot of environmental factors including diet, metabolic status, and physical activity are the main contributors to over weightiness and in return are prejudiced by some genetic traits. Most of the time, excess fatness in the body results from a long-spans imbalance between energy intake and expenditure (Ivashchenko et al., 2015).

In a large number of countries including the United States there is evidence among youth that physical activities have declined in the last few decades and the equivalent growth in prevalence of over weightiness might be the direct consequence of such declines (Kim et al., 2003). According to Australian research among 10 to 11years aged students comparing their physical activities also confirmed that a decrease in physical activities causes serious problems. For example, the relationship between physical activity and obesity with energy intake status differs across different studies. Few studies have testified an inverse relation between adiposity level and activity while few also have not found any relationship (Pan et al., 2016).

Several metabolic factors have the power of influencing the onset of obesities. These comprise energy expenditure during resting, the food-related effects in which foods and drinks induce rising metabolic rates, energy expenditure-related activities such as well as utilization of fuel. Anyhow, a lot of research in this field on adults have been showed positive results among adult students but not among the infant populations (Srikanth et al., 2015). Among college students, there are variations recorded in resting energy expenditures (REE) however, although such variations among individuals in terms of REE might influence the overall daily expenditures of energy only a little impact on the tendencies to gain weight significantly (Erflle & Gamble, 2015). Likewise, during energy-consuming effects of foods in people with obesity might be reduced while the higher weight gains are too low to be taken as a likely cause of over weightiness (Skurikhina et al., 2016).

Material and Methods

Population

The population is a sum of individuals who keep the difference abilities than others. This study was conducted in Peshawar City that is located in the Khyber Pakhtunkhwa province of Pakistan. It is the 6th biggest city of Pakistan. Total samples (N=70) female students volunteers (age 16-20 years) of Govt. College for Women, Peshawar were selected through convenient sampling method to analyze the health and fitness levels with the help of anthropometrics measurements. The exercise and fitness training-based research was conducted with the ethical approval of college administration with promising to not public any kind of personal data or records except to fulfill the requirements of current research project.

The tests of physical fitness were conducted to evaluate the variables of fitness after giving them training of physical activities including standing broad jumps, agility, dash for running, flexibility regarding sit and reach tests, hand grip strengths by dynamometer, balance and endurances. All variables and statics were recorded using specific sheets on daily and weekly basis.

Physical Fitness variables are

Measures	Variables
T-test	Agility
Standing broad jump	Leg power
Stop watch (Fastime 9)	30m sprint for running
Set and reach	Flexibility
Dynamometer (Camry EH101)	Hand grip strength
600 meters	Endurance

Anthropometric variables are	
Measures	Variables
Sink fold caliper	Skin fold (bicep, triceps, abdominal)
Measuring tape (Dritz 120")	Girth (chest, waist, hip, thigh)
Large sliding caliper (Neiko 01409A)	Length measurements (upper & lower limb)
Bone caliper	Breadth (humorous, femur)
Digital weight machine (Casino)	Weight

Training Procedure

The strength training of 8 weeks (5 days per weeks) which comprises of different physical activities which are described below (Weinstock et al., 2014):

In the first day of every week of training, the race of 30 m and 50 sit ups were included.

In the second day of every week of training, the race of 400 m and 30 sit ups were included.

In the third day of every week of training, the matches of badminton and volley ball were played and 30 sit ups also performed.

In the fourth day of every week of training, the skipping of rope for 10 mints, 30 sits and ups and aerobics were also performed.

In the fifth day of every week of training, race of 30m and 50 sit ups were included.

Data Analysis

Descriptive statistics were applied for all variables to get mean and standard deviation of the college girls. Paired t-test was applied to examine the effect of strength training on physical fitness and anthropometry of college girls. The p. value was adjusted 0.5 for all measures. The SPSS version .25 was used for statistical Analysis (Pope & Harvey-Berino, 2013).

Results and Discussion

Table 1
Demographical Data of college girls of Peshawar

Variables	Pre Data		Post Data		T	Sig
	Mean	Std. D	Mean	Std. D		
Height (cm)	176.00	2.24	176.40	2.97	-0.24	0.41
Weight (kg)	72.40	5.18	67.40	6.02	1.41	0.53
Arm spam	157.18	4.61	157.28	4.61	1.54	0.23
Hand grip strength (kg)	20.10	2.93	29.70	4.71	-3.87	0.12

"Significant value at 0.5 levels."

The above table shows that there was significant difference in their weight as before training (M=72.40), (SD=5.18) and after training (M=67.40), (SD=6.02) with t= 1.41, sig= 0.53. There was significant difference in their hand grip strength before

training (M=20.10), (SD=2.93) and after training (M=29.70), (SD=4.71) with $t= -3.8$, $sig= 0.12$. There was no significant difference in their heights before training (M=176.00), (SD=2.24) and after training (M=176.40), (SD= 2.97) with $t= -0.24$, $sig=0.41$. There was no significant difference in their arm spam as before training (M=157.18), (SD=4.61) and after training (M=157.18), (SD=4.61) with $t=1.54$, $sig=0.23$.

Table 2
Physical Fitness of college girls of Peshawar

Variables	Pre-Data		Post Data		t	Sig
	Mean	Std. D	Mean	Std. D		
30m dash	3.81	0.83	3.38	0.18	1.11	0.08
Standing broad jump	126.80	9.68	137.20	3.19	-2.28	0.03
Flexibility	8.32	1.13	9.04	1.26	1.02	0.04
Endurance	198.27	24.54	196.22	24.32	1.26	0.25
Skipping	70.23	13.72	77.51	13.08	1.60	0.22
Agility	8.52	1.28	6.94	1.02	1.91	0.27

“Significant value at 0.5 levels.”

This table Shows there was significant difference in their 30m dash as before training (M=3.81), (SD=0.83) and after training (M=3.38), (SD=0.18) with $t= 1.11$, $sig=0.08$. There was significant difference in their leg power as before training (M=126.80), (SD=9.68) and after training (M=137.20), (SD=3.19) with $t=-2.28$, $sig=0.03$. There was significant difference in their flexibility as before training (M=8.32), (SD=1.13) and after training (M= 9.04), (SD=1.26) with $t= 1.02$, $sig=0.02$. There was significant difference in their endurance as before training (M=198.27), (SD=24.54) and after training (M=196.22), (SD= 24.32) with $t= 1.26$, $sig=0.25$. There was significant difference in their agility as before training (M=8.52), (SD=1.28) and after training (M=6.94), (SD=1.02) with $t=1.91$, $sig=0.27$.

Table 3
Anthropometric Measurement of College Girls of Peshawar

Variables	Pre-Data		Post Data		t	Sig
	Mean	Std. D	Mean	Std. D		
Abdominal Skin fold	11.17	1.84	10.52	1.46	2.03	0.04
Bicep skin fold	10.07	1.39	9.38	1.27	1.11	0.01
Triceps skin fold	12.05	1.33	11.10	1.26	0.69	0.45
Chest girth	78.80	10.57	76.44	10.11	1.24	0.04
Waist girth	68.28	10.74	66.30	10.30	2.68	0.16
Hip girth	81.47	11.85	78.85	11.45	0.58	0.05
Thigh girth	48.43	4.75	46.22	4.30	2.07	0.22

“Significant value at 0.5 levels”

This table Shows that there was significant difference in their abdominal skin fold as before training (M=11.17), (SD=1.84) and after training (M=10.52), (SD=1.46) with $t=2.03$, $sig=0.01$. There was significant difference in their bicep skin fold as before training (M=10.07), (SD=1.39) and after training (M=9.38), (SD= 1.27) with $t=1.11$, $sig=0.01$. There was significant difference in their triceps skin fold as before training (M=12.05), (SD=1.33) and after training (M=11.10), (SD=1.26) with $t= 0.69$, $sig=0.45$. There was significant difference in their chest girth as before training (M=78.80), (SD=10.57) and after training (M=76.44), (SD=10.11) with $t=1.24$, $sig= 0.04$. There was

significant difference in their waist girth as before training ($M=68.28$), ($SD=10.74$) and after training ($M=66.30$), ($SD=10.30$) with $t= 2.68$, $sig=0.16$. There was significant difference in their hip girth as before training ($M=81.47$), ($SD=11.85$) and after training ($M=78.85$), ($SD=11.47$) with $t=0.58$, $sig=0.05$.

Findings

- The results indicated that strength training significantly affected on the physical fitness and body composition of college girls.
- This study was proving that null hypothesis was rejected because strength training was significantly affected on the weight and mass of overall body, chest, hip, thigh, waist, bicep, triceps, and abdominal parameters with 0.5 significant values.
- The considerable differences in the time period of 30m race, considerable improvement in agility, flexibility and endurance has been found which established imperative worth of fitness training and exercise programs for college girls.

Discussion

Result shows that strength training has insignificant impact on body height and arm span of college girls. The height of college girls does not affect by the strength training. There was significant difference in body weight of college girls after training as weight of college girls is reduced after strength training. Further of physical fitness test measurements i.e., agility, flexibility, endurance, standing broad jump, skipping have significant correlation with strength training. Strength training improves the physical fitness of college girls.

The result shows that skin fold measurements have significant differences as before and after training. Strength training improves the body composition of college girls. Strength training has significant impact on physical fitness and body composition of college girls. Strength training increases physical fitness and reduces body fats in college girls. After strength training college girls become physically active along with healthier anthropometric profiles and low levels of body mass. The results indicated that strength training was significantly affected on the physical fitness and body composition of college girls. Quite a lot of findings on the efficiency of exercises and fitness interventions including dieting recommend that dieting and exercising make instantaneous and long term potential health impacts for improvement and maintenance of physical capability (Sonstroem & Walker, 1973). The dieting and exercising interventions such as aerobic activities, cycling, resistance training, walking and few combinations are the ideal instances (Dishman et al., 1991). In a large number of countries include the United States there are evidences among youth that physical activities have declined in last few decades and the equivalent growth in prevalence of overweightness might be the direct consequence of such declines (Kim et al., 2003).

Conclusion

The current study was intended to examine either strength training had an impact on females' body composition or not. It is concluded that strength training directly effects on the physical fitness and body composition of college girls. Physical

fitness plays an important role in influencing the development of our whole body. Physical activities are important for the health of college girls. It is concluded that strength training increases the physical fitness and reduce the fats in the body of college girls. This study has proved that null hypothesis was rejected because strength training was significantly affected on the weight and mass of overall body, chest, hip, thigh, waist, bicep, triceps, and abdominal parameters with 0.5 significant values. The considerable differences in the time period of 30m race, considerable improvement in agility, flexibility and endurance has been found which established imperative worth of fitness training and exercise programs for college girls. In this current study the researcher finds out that strength training directly effects on the physical fitness and body composition of college girls. In a large number of countries include the United States there are evidences among youth that physical activities have declined in last few decades and the equivalent growth in prevalence of overweightness might be the direct consequence of such declines (Kim et al., 2003). According to Australian research among 10 to 11 years aged students by comparing their physical activities also confirmed that decrease of physical activities cause serious problems. For example, the relationship between physical activity and obesity with energy intake status differs across different studies. Few studies have testified an inverse relation between adiposity level and activity while few also have not found any relationship (Marsh & Peart, 1988).

Recommendations

The research was conducted on the college girls (age 16-20 years) of Govt. Frontier College for Women Peshawar. In the light of findings of present study, the following recommendations are made for further study.

The fitness level of college girls is different; it is recommended that similar study may be conducted by the subject select belonging to different age group. Similar study may also be conducted by the subject select belonging to urban colleges. Similar study may be conducted on psychological variables to improve the standard of physical fitness. In the light of findings of present study, the researcher recommended that the college girls regularly participate in strength trainings to avoid the obesity and maintain their physical fitness. Strength trainings are necessary for the activeness and improvement of their physical fitness. In depth exploration of what is the effect of strength training on physical fitness and obesity of college girls more work is needed to fill the research gap in this area of research.

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