

EFFECT OF EXTENDED KNEE SIT-UP ON THE STRENGTH OF ABDOMINAL MUSCLES OF FEMALE SECONDARY SCHOOL STUDENTS IN ANAMBRA STATE

¹ N.A Ujuagu,² T.N Uzor,³ S.N. Igwilo

¹nonyeujuagu@gmail.com,

²nkiruzor@gmail.com, ³sn.igwilo@unizik.edu.ng

¹+2348060763070, ²+2348034178870, ³+2348064643861

^{1,2,3}Department of Human Kinetics and Health Education

^{1,2,3}Nnamdi Azikiwe University, Awka

Anambra State, Nigeria.

Abstract

The study investigated effects of extended knee sit-up on the strength of abdominal muscle of female secondary school students in Anambra State. Two research questions and two null hypotheses guided the study. The design used in the study was true experimental design which utilized the pre-test post-test control group. The population was 3,854 female secondary school students. Sixty (60) female students were selected from JSS I and SS I and SS II using simple random sampling. Data were analyzed using mean in answering the research questions, while Analysis of co-variance was used to test the hypothesis at .05 level of significance. The findings among others; were that the subjects who received training in extended knee sit-up performed significantly better than the control group who were not trained. Among the recommendation made was that extended knee sit-up exercise should be used for screening purposes in the selection of athletes especially activities requiring strength of the abdominal muscles.

Keywords: Exercise, Abdominal Muscle, Physical Fitness and Female Students.

Introduction Exercise is a very important issue and a key element in life especially for our youth. In recent years, people have begun to understand that living a healthy lifestyle is really the key to longevity and that engaging in regular, consistent exercise is a critical agent of healthy living. According to Kylasova (2011), exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. Exercise is important throughout life but is essential in youth's growth and development. Haskeel et al (2012) defined physical fitness as a state of health and well-being and more specifically, the ability to perform aspects

of sports, occupations and daily activities. Physical fitness is generally achieved through proper nutrition, Moderate Vigorous physical exercise and sufficient rest (Malina 2010). All living individuals have some degree of physical fitness, but the degree varies considerably among different people and in the same person from time to time (Douglas, 2013).

Generally, human being can only perform work when they are physically fit and it has to do with mental, emotional, social and spiritual contribution that enhanced physical fitness, when one is physically fit, he is more likely to be at ideal weight, feel better about himself and his appearance and also live a healthier and fruitful life. With increased automation, keeping fit has become a universal problem and today many people are worried about the general state of their health. Physical fitness is categorized into two, health related and performance-related physical fitness.

An important dimension of the health relate physical fitness in this work is muscular strength. Muscular strength is the ability to generate the maximal amount of muscle force on a particular exercise and also refers to the amount of force a muscle can produce with a single maximal effort (Richard 2019). According to Uchegbu (2013), muscular strength is the ability or capacity of a muscle or muscles group to exert a non-time maximal force against resistance through its full range of motion. Muscular strength is important, because without it, one would be unable to participate in recreational sports, support one's own body weight, or even lift oneself out of chair. Strength is needed in all kind of work and physical activity.

The abdominal muscles are a group of six muscles that extend from various places on the ribs to various places on the pelvis. They provide movement and support to the trunk. In many cases, the lack of strength of abdominal muscles is a primary cause of recurrent low back problems and also weak abdominal muscles and Flexible posterior thigh muscles allow the pelvic to tip forward, thereby causing an abdominal arch in the lower back that result in low back pain (Uchegbu 2013). Mullen (2015) observed that many people are on a quest to achieve a flat stomach especially among female folk. The obsession with the abdominal area can cause frustration, anxiety and can even lead to eating disorders. Cases abound where people take herbs in the form of dietary supplements, engage in drug abuse and deny themselves of regular meals, just to keep their abdomen flat. These acts have been found to be injurious to health. A weak flabby abdomen is usually accompanied by weak back muscles.

As the abdominal muscles weaken because of lack of specific exercise, the back muscles also weaken (Mullen, 2015).

Among children, particularly teenagers, the need for strong abdominal muscles is important to further enhance their growth and development. In our society today many people have the problems of sagging, flabby and protruding abdomen which are caused by many factors like, lack of specific exercise, things people eat and drink. Well-developed abdominal musculature is important in maintaining trunk and spine stability to reduce low back pain and enhance athletic performance (Nahid 2016). The sit-up is a strength training exercise commonly performed with the aim of strengthening the hip flexors and abdominal muscles. It is proper to reiterate that physical fitness programmes including tests, are basic in the area of physical health education and recreation. Definite steps should be taken to ascertain the physical fitness of each student in school and to institute individual remedial and developmental programmes for those who require them, that is those who are physically unfit. It should also be noted that good physical condition is equally desirable for boys and girls of post primary school age in order to prepare them for strenuous tasks in future. Therefore, it is beneficial to undertake an empirical study which might establish the effect of extended knee sit-up on the strength abdominal muscles of female secondary school students.

The following research questions guided the study:

1. What are the mean scores of the strength of abdominal muscles of female students in JSS I, and JSS II who are trained in extended knee sit-up and those not trained?
2. What are the mean scores of the strength of the abdominal muscles of female students in SSI and SS II who are trained in extended knee sit-up and those not trained.

Hypotheses

The following hypotheses were formulated to guide the study at 0.05 level of significance.

1. There is no significant-difference between the mean scores of the strength of abdominal muscles of female students in JSS I and JSS II, who are trained in extended knee sit-up and those not trained.
2. The mean scores of the strength of the abdominal muscles of female students in SSI and SS II who are trained in extended knee sit-up and those not trained did not differ significantly.

Method

The study adopted true-experimental design. It utilized the pre-test post-test control group design. In this design two groups of subjects are involved, the control group and experimental group.

The population of the study consisted of all female students in the 10 Secondary School in Anambra East Local Government Area of Anambra State, whose total number was 3,854 (Dept of planning and statistics, Post Primary Secondary School Commission Otucha 2020). The sample that was used in this study was 60 female secondary school students. Purposive Sampling technique was used to select two secondary schools in Anambra East Local Government Area, and the reason for the choice of the school was based on its accessibility for monitoring and supervision of the exercise. By simple random sampling, from each of the two schools, 60 female students was selected. 30 in JSS I and 30 in SS I and SS II the reason for selecting these set of students is that they are not in exam class and the subject are also closely related since they all fall into teenage group and have similar immediate environmental exposure as regards the overall school programme.

Instrument for data collection was the flex knee sit-up and extended knee sit-up. The flexed knee sit-up was used in administering the pre-test and post-test which was similar to that advocated by Eurofit Fitness testing battery (1997). This test measures endurance of the abdominal and hip flexor muscles, the aim is to perform as many sit-ups as you can in 30 seconds. Extended knee sit-up was used in training the abdominal muscle of the subjects after the pre-test. The 60 students were given pre-test after which they were divided into two groups control and experimental group. The control group did not receive any training while experimental group was trained for four weeks after which post-test was given to both groups again to know how the training affects the strength of their abdominal muscle and scores were collected and recorded. The data collected were analyzed using descriptive statistics of mean score to answer the research questions, while the null hypothesis was tested at 0.05 level of significance using analysis of Covariance (ANCOVA).

Result

Research Question I: What are the mean scores of the strength of the abdominal muscles of female student in JSS I and JSS II, who are trained in extended knee-sit-up and those not trained?

Table I: Mean Scores of the strength of abdominal muscles of female students in JSS1 and JSS11 who are trained in extended knee sit-up and those not trained.

Group	N	Pre-test		Post-test	
		\bar{X}	\bar{X}	\bar{X}	\bar{X}
		Gain			
Ex-Group	30	12.067	19.267	7.2	
Cont. Group	30	11.567	12.967	1.4	
Mean Differences		0.5	6.3	5.8	

From the Table 1, the mean score for the experimental group is 12.067 for the pre-test, 19.267 for the post-test, while that of the control group is 11.567 for the pre-test, 12.967 for the post-test. The mean gain score showed 7.2 for the experimental group and 1.4 for the control group. This shows that experimental group had a higher mean score after post-test than the control group; which indicates improvement after training with extended knee sit-up.

Research Question 2: What are the mean scores of the strength of the abdominal muscles of female students in SSI and SS II who are trained in extended knee sit-up and those not trained.

Table 2: Mean scores of the strength of the abdominal muscles of female students in SSI and SS II who are trained in extended knee sit-up and those not trained.

Group	N	Pre-test		Post-test	
		\bar{X}	\bar{X}	\bar{X}	\bar{X}
		Gain			
Ex-Group	30	14.57	19.53	5.0	
Cont. Group	30	12.23	14.27	2.0	
Mean Differences		2.3	5.3	3.0	

The result in Table 2 showed that the experimental group has a mean score of 14.57 for pre-test and 19.53 post-test. The control group had 12.23 for pre-test and 14.27 for post-test. The mean gain revealed 5.0 for the experimental group and 2.0 for the control group. This shows that experimental group had a higher mean score after post-test than the control group; which indicates improvement after training with extended knee sit-up.

Hypothesis I: There is no significant difference in the mean scores of the strength of abdominal muscles of female students in JSSI and SS II who are trained in extended knee sit-up and those not trained.

Table 3: Summary of ANCOVA for female students who are in JSS I and SS II.

Sources of Variation	Df	Sum of Squares	Mean Squares	Cal f	Crit.f	Decision
Between group	1	537.935	537.935			
Within group	58	197.196	3.3999	58.22	4.00	Reject H ₀₁
Total	59	735.131				

The result in Table 3 indicated that the strength of the abdominal muscles of female student that was trained has a significant effect since the calculated value of 58.22 is far greater than the critical F of 4.00 at 0.05% percent significant level, 1 degree of freedom of the numerator and 58 D.F denominators. The null hypothesis is rejected.

Hypothesis 2: There is no significant difference in the mean score of the strength of abdominal muscles of female students in JSS I and SS II who are trained in extended knee sit-up and those not trained.

Table 4: Summary of ANCOVA for female students who are in JSS I and SS II

Sources of Variation	Df	Sum of Squares	Mean Squares	Cal f	Crit.f	Decision
Between group	1	199.5933	199.5933			
Within group	58	366.0564	6.3113	18.95	4.00	Reject H ₀₂
Total	59	565.6497				

The result in table 4 showed that at 0.05% significant level, I degree of freedom of the numerator and 58 Df denominators, the calculated F 18.95 is greater than critical F of 400, there the null hypothesis is rejected and the alternative accepted indicating that the strength of the abdominal muscles of female students that was trained had a significant effect.

Discussion

The results of the data as contained in Table I, in answer to the research question 1 showed that students who were trained in extended knee sit-up performed better after the post test, than those who were not trained. This reflected in Table 3 were the null hypothesis was rejected. Thus the findings is in line with Takeshima et al (2010), that used concurrent aerobic and resistance exercise to test the effect of the strength of abdominal muscle, observed that the abdominal muscle strength and endurance improvement was attributed to aerobic exercise training program. The findings is also similar to the result of study that used 12 weeks of aerobic exercise on the abdominal muscle strength and endurance which showed significantly more improvement in the abdominal muscle strength (Chia- Lin, Hsu-Min, Rou-Fang, & Shwn-Jen (2006). Saunders (2008), on study of electromyography of abdominal muscular activity during exercise, submitted that the chief muscles involved in extended knee sit up was the most effective in strengthening abdominal muscles. The findings of this study are also in consonance with Jay (2007), who in his studies stated that no exercise is an extensively used as sit-up. He further added that the abdominal muscles are active only as long as the upper back is partly lifted as soon as the lower is raised, performing sit-up with legs held straight and concavely arched to any degree will strengthens the abdominal muscle.

The result obtained in Table 2 from research question 2 revealed that there was an improvement on students who were trained with extended knee sit-up. This indicated that training with extended knee sit-up has a significant effect on the abdominal muscle of the female student. The null hypothesis is thus rejected. The findings of Gretchen (2009), supported the assertion that strength exercises such as sit-up have effect on strength of abdominal muscles and decreases the risk of lower back injury. The findings also agree with Parfrey Docherty, Workman and Behm, D.G. (2008) were they stated that sit-up position were varied and randomized through 3 variables the bent knee, fixed or non-fixed and that there was a trend showing that the bent knee sit-up position has an effect on the abdominal muscle. The findings corroborate the view of Escamilla and Courneya (2010) who started in his

studies on total and intra-abdominal body fat states that strengthening of the abdominal muscle can be recommended for those with protruding abdominal.

Conclusion

The findings of this study shows that female secondary school students in JSS I and JSS II who were trained in extended knee sit-up performed better than those who were not trained also female secondary school students in SS I and SS II who were trained in extended knee sit-up performed better than those who were not trained.

Implications for the study

The study has created a tremendous effect on the students and even their teachers who were around during the training, that extended knee sit-up is a very good exercise for the development of abdominal muscles. It has also increased the students' interest in exercise especially the corrective type of exercise. The result of this study has also shown that extended knee sit-up will help to reduce the protruding abdomen or stomach of those that have it.

Recommendations

On the basis of the findings and conclusion, researchers recommended as follows:

1. In view of the effect of this exercise on students, physical fitness activities should be included in schools in order to improve the general physical fitness level of the students.
2. From the result, some students had their abdominal muscles improved as a consequence of the extended knee sit-up, hence, this exercise should be used for screening purposes in the selection of athletes especially activities requiring strength of the abdominal muscles.

References

Chia-Lin, L. Hsu-Min, .T. Rou-Fang,T.& Shwn-Jen,L.(2005).*The effectiveness of an Aerobic Exercise Intervention on Worksite Health-Related Physical Fitness*.The Department of Health Care Management and Healthcare Databank Laboratory, Chang Gung University, Taoyuan; Faculty and Institute of Physical Therapy, National Yang-Ming University, Taipei.

-
-
- Department of Planning and Statistics PPSSC Otuocha (2017). *Statistics of School Population*. Anambra East Local Government Education Zone.
- Douglas, H. P. (2013) *Physical fitness appraisal and guidance*. St Louis Missouri: Harper and Row Publishers.
- Eurofit, (1997). *Eurofit Tests of Physical fitness* 2nd Edition, Strasbourg.
- Escamilla, R.& Courneya, D.(2010). Effect of exercise on total and intra abdominal body fat. *Journal of American medical association*.
- Gretchen, R. (2009). *Is your about workout hurting your back?* The New York Time. Retrieved 2020.
- Haskell, W. Trioiano, R.P. Hamond, J.A. Phillips, M.J. Strader, L.C. & Marquez, O.X. (2012). “ Physical activity and physical fitness standardizing assessment with the phenx toolkit” *American journal of Preventive medicine*, 42 (5); 486-92.
- Jay, B. (2007). *Physical fitness*. New York: The Ronald press company.
- Kylasou, A. Gavrov, S. (2011). *Diversity of sports non-destructive evaluation paris: UNESCO encyclopedia of life support systems*. p.p 462-091 ISBN 978-5-89317-227-0
- Malina, .R. (2012). Physical activity and health education of youth Constanta: ovidious university annals, series physical education and sport/science, movement and health.
- Mullen, A.U (2015). *Fitness management, physical activity programme*. J.B appincolt
- Nahid, t. khosio, . k. & shapour , J. measurement or superficial and deep abdominal muscle thickness: an ultra sonography. *Journal of physiological Anthropology*, 35.
- ParFery, K. C. Docherty, D. Workman, R.C.& Behm, D.G. (2008). Effect of sit-up and curl-up position on activation of abdominal and hip flexor musculature. *International journal of sports medicine*.
- Richard, .f. md (2019). *Understanding muscular strength*.
- About , inc. (Dot dash) [https://www. Very .retrieved feb 2020](https://www.veryfit.com/).
- Saunders, J. (2008). Electonmy gaphic study of abdominal muscular activity during exercise. *Research quarterly*,36(1).
- Takeshinma, N. Rogers, M.E. Islam, M.M. Yamauchi, T. Watanabe, E. Okada, A. (2009). Effect of concurrent aerobic and resistance circuit exercise training on fitness in older adults. *EnrJ Appl physiol* 93; 173- 82.
- Uchegbu, J. N Okafor,. S. Okafor, U. & Nwaiwu, .N. (2013). *Activity science and physical fitness: ways of life*. Onii publishing house.