

Effect of circuit training on Hemoglobin of school students

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Abstract: The purpose of this study was to investigate the effect of circuit training on the Hemoglobin of school students Meerut, Uttar Pradesh. To achieve the purpose of the study, sixty (60) male students were selected who served as subjects, and their age group was between 9 to 14 years. The selected subjects were divided into two groups i.e., experimental and control group. 30 male students were selected for each group as research subjects. The experimental group underwent through circuit training exercise consisted 8 stations for 12 weeks. The control group was not given any training apart from their regular activities. The physiological variable which was examined during the study was hemoglobin. All the data which was collected before the training and after applied the training program were examined by using the dependent “t” test to find out the significant difference between the means of pre and post-test score of the experimental group after applying 12 weeks of circuit training. The level of confidence was fixed at 0.05. The obtained t score of Hemoglobin was found higher than the required table value 1.67 to be significant at 0.05 level of confidence at df 58. It shows that Post data score of school students of the experimental group is found better than the Post data of the control group of school students.

Key Words: Circuit Training, Hemoglobin, School Students

INTRODUCTION

Traditionally, coaches, physical education teacher and trainers have planned conditioning programs for their teams by following regimens used by teams those successful win-loss records. This type of reasoning is not sound because win-loss records alone do not scientifically validate the conditioning programs used by the successful teams. In fact the successful team might be victorious by virtue of its superior athletes and not it's outstanding program. Without question the planning of an effective athletic conditioning program can best be achieved by the application of proven physiological and physical training principles. Optimizing training programs for athletes is important because failure to properly condition an athletic team, school games team results in poor performance and often defeat. To improve performance and fitness of school student's circuit training was administered in this study.

Regular exercise is well known to improve health and reduce a number of risk factors for chronic disease. Typically, participation in exercise follows a traditional approach of separate resistance and aerobic exercises. This combination of exercise training modalities improves body composition and cardiovascular fitness in both sedentary and overweight populations. Despite the health benefits, approximately 47% of Canadian adults fail to participate in physical activity more than 1 day a week and 85% do not meet Canada's new physical activity recommendations. Potential reasons for this lack of participation in physical activity include barriers such as accessibility to gym equipment or a fitness facility or lack of

time. Furthermore, many people view physical activity itself as time consuming, in addition to other time-consuming factors such as travel time to a fitness facility. These barriers deter people from performing physical activity, preventing positive benefits.

Circuit training was first proposed by Morgan and Adamson (1959) of Leeds University as a method for developing general fitness. Their initial circuit training routine consisted of several stations arranged in a circle (hence the name circuit training) so as to work muscle groups alternately from station to station. (Bompa and Buzzichelli, 2005) Circuit training is a safe, effective and fun approach to exercising that can be enjoyed by a variety of people; it is attractive to men and women, younger and older age groups, sports people and the general population. It can be performed indoors and outdoors and in water. (Lawrence, Richard, 2015) The speed at which specific movements are performed within specific sporting activities will also need to be considered. If movement needs to be performed quickly, then some attention should be paid to performing them at the speed required when training. (Hope and Lawrence 2014).

Hemoglobin a protein in red blood cells which contains iron. It is used to transport oxygen in blood around the human body. Hemoglobin is found in the red blood cells of all vertebrates apart from white-blooded fish. It also occurs in some invertebrates. Some other invertebrates use other chemicals such as hemocyanin, Hemoglobin is involved in the transport of other gases. It carries some of the body's respiratory carbon dioxide (about 20-25% of the total).

Physical activity has become a major concern worldwide. A study involving large amount of participants over 15 years old, reported that about 20% did not engage in sufficient physical activity (Dumith, Hallal, Reis, & Kohl, 2011). Physical activity raises many problems on health, especially on non-communicable diseases. Sedentary behaviors are attributed to increased risk of metabolic syndrome in young adults (Salonen et al, 2015) Physical activity is also related with malignancy. Shoemaker et al reported physical activity as a modifiable risk factor for cancer in young adult both male and female (Shoemaker et al., 2017). Sedentary behavior is considered as the fourth highest risk factor leading to death after hypertension, tobacco use, and high blood glucose (WHO, 2018). Otherwise, it has been reported widely the numerous advantages of increased physical activity on health. The benefits of exercise have been documented, including reducing the risk for all-cause mortality, heart disease, high blood pressure, stroke, type 2 diabetes and some cancers (Kushi et al, 2012). The effects of exercise on body's organ system are usually positive and in single form. For example, the effect of exercise on vascular system is to diminish peripheral resistance and to lower blood pressure. There has been no evident an inverse effect. However, exercise has a distinct effect on hematologic profile. A study by Pourghardash & Nikseresht reported that aerobic exercise increased hemoglobin (Hb) concentration and hematologic factors in young females (Pourghardash & Nikseresht, 2017).The increased Hb lead to increase oxygen carrying capacity and maximal oxygen capacity. In the other hand, Çiçek (2018) found an opposite result in his study. Exercise decreased red blood cells (RBC), hemoglobin (Hb), and hematocrit (Hct) in sedentary women (Çiçek, 2018) Iron deficiencies Anemia is the most prevalent micronutrient deficiency in the world population. (Ahmadi A et al. 2010) About 16% men aged between 12-49 years have iron deficiency in the United States. (Karl JP et al.2010) When there is an imbalance between iron intake and iron excretion, iron deficiency anemia can be resulted. (Kang HS et al. 2004) Furthermore it is an essential element of Hb, the blood oxygen carrier. By these means, iron depletion can affect Physical performance. (Shabkhiz F et al. 2009) Everyone has different goals when doing Physical activities, if done properly, can increase the degree of vibrant health to prevent disease, Physical activity is related to psychological satisfaction and self-determined motivation. (Stuntz C.P. et al. 2017) Cardiac muscles can develop due to the influence of physical activity. A fit person's heart and lungs will supply more blood and oxygen to their body tissues so they do not need to work too hard compared to people whose heart and lung systems are not fit. Exercise significantly increased absolute and relative variable. (Lin X et al. 2015)

Further analyzing, a strong body permits the efficient and free movement of the body spending least energy. That said, also includes an inculcation of a stable, confident, efficient, functioning body. Overall strong or strength of the body can be grossly classified into upper and lower body strength. Furthermore, this study chooses to emphasis its study on the leg

strength for its study. (Cronkleton, 2019). The ability of the neuromuscular system to show strain in the shortest feasible time is defined as explosive strength (Verhoanski, 1979). Established the concept of reversible strength in his definition of explosive strength, which consists of two phases: eccentric (stretch) and concentric (shortening). As quickly as feasible after the muscle extension phase, the concentric phase should begin. With increase in age, the human body undergoes skeletal structural and functional changes, resulting in a loss of muscle mass and strength occurs (Porter, 1998; Lexell, 2008). Undoubtedly, athletic competition requires fitness beyond that necessary for optimal health. But the value of specific motor abilities test items to athletes and coaches, and the use that can be made of data collected, have been much debated (Gollnick and Mataba, 1984, Noakes, 1988).

METHODS

The subjects were selected from Panchwati Public School, Meerut. Total 60 students were selected For the purpose of the study and before selecting the final subjects of the research, cooper's 12 minute run/walk test will be conducted to assess the performance of population. The age level of the subject was taken between 9-14 years. The physiological variable that was taken into account was Hemoglobin.

Circuit Training Program

The experimental group was trained five times a week on Monday to Friday for Twelve weeks. Training protocol included a five-minute warm-up and two rounds - in 28 min - of eight station circuit training with 30 sec exercise and 60 sec rest at each station. The circuit stations include Interval Runs, Long, Slow Runs, Leg Strength Exercises, High Knees, Squat jumps, and Lateral Plyometric Jumps. Lateral plyometric jumps help build explosive power, balance, and coordination by using our natural, Forward Running, High-Knee Drills, Lateral Running, Side-to-Side Drills, Jump Box Drills, Shuttle Runs, strength exercise, cardiovascular exercise, battle rope, leg raise, sprints races etc. In the last six weeks, subjects were trained three rounds of the same circuit in 42 min, however, with increase rest period to 90 sec in each station. The training sessions in this phase ended with a five minutes cool down. The control group maintained their normal routine, however, and was not involved in any physical training. Training and data collection were done at the school students, Meerut Uttar Pradesh.

Hemoglobin test administration

The Hb Hemoglobin Test strips (whole blood) are firm plastic strips onto which a multilayer dry reagent is affixed and are intended to be read on the mission Hb Hemoglobin meter. The test strips function by lysing erythrocytes and converting the released hemoglobin into met hemoglobin. This test is for the

quantitative determination of hemoglobin (Hb) and calculated hematocrit (Hct) in Capillary and venous whole blood.

Directions for use-insert the code chip into the meter correctly. Refer to coding the meter in the user’s manual for details. Compare the code number on the code chip with the code number printed on the test strip canister label and ensure the two numbers are identical to avoid inaccurate results.

Remove the strip from the closed canister and use it as soon as possible. Immediately close the canister tightly after removing the required number of strips. Wait for the meter to flash the strips symbol. Insert the strip completely into the strip channel in the same direction as the arrows printed on the test strip until the white edge above the black line on the strip is no longer visible.

Wipe away the first drop of blood 10ul of second drop of capillary blood using a capillary Transfer tube or pipette. Refer to the User’s Manual for details. Hold the tube slightly downward and touch the tip of the capillary Transfer Tube to the blood drop. Capillary action will automatically draw the sample to the fill line and stop.

Statistical Technique

Find out the effect of circuit training on selected Hemoglobin of School Students, the paired two samples for means dependent t-test was applied.

Analysis of the data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent ‘t’ test was used with 0.05 levels as confidence.

RESULTS

Table I: Analysis of t-ratio for the Pre and Post Tests of Experimental and Control Group on Hemoglobin (Scores counts in number)

Variable	Group	Mean		SD		‘t’ ratio
		Pre	Post	Pre	Post	
Hemog.	Con.	11.30	11.36	0.76	1.04	0.55
	Ex.	11.72	13.23	2	2.10	6.75*

*Significance at 0.05 level of confidence df (58) =1.67

Table-I shows that the mean values of pre-test and post-test of the control group on hemoglobin were 11.30 and 11.36 respectively. The obtained ‘t’ ratio was 0.55, since the obtained ‘t’ ratio was less than the required table value of 1.67 for the significant at 0.05 level with 29 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on hemoglobin were 11.72 and 13.23 respectively. The obtained ‘t’ ratio was 6.75* since the obtained ‘t’ ratio was greater than the required table value of 1.67 for significance at 0.05 level with 29 degrees of freedom it was found to be statistically significant. The result of the study showed that there was a significant difference between control group and experimental group in hemoglobin. It may be

concluded from the result of the study that experimental group improved in hemoglobin due to twelve weeks of circuit training.

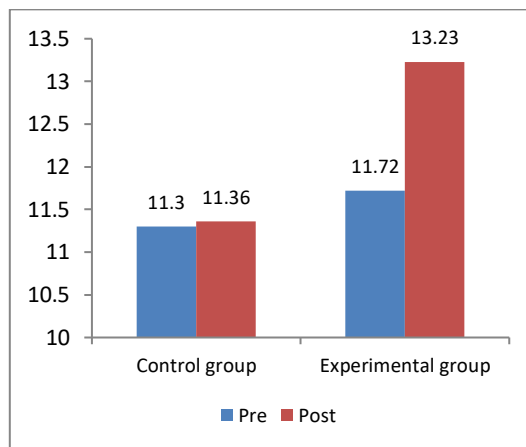


Fig 1: Bar Diagram Showing the Pre and Post Mean Values of Control and Experimental Group on Hemoglobin.

DISCUSSION

The result of the study indicates that the experimental group, namely circuit training group had significantly improved the selected dependent variable, namely hemoglobin, when compared to the control group. It is also found that the improvement caused by circuit training when compared to the control group. The result of this study on Hemoglobin has in line with the study conducted by (Ramin Shabani 2015), (Pukhraj Singh 2017), (Yunuar Kiram et al. 2018).

CONCLUSION

- On the basis of the results obtained the following conclusions are drawn,
- There was a significant difference between experimental and control group on Hemoglobin after the training period.
- There was a significant improvement in hemoglobin. However the improvement was in favor of experimental group due to twelve weeks of circuit training.
- According to the positive effect of Circuit training, it seems that can be recommended for School Students, College Students, and Anemia Patients with diabetes.

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