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Influence of Strength Training on Sugar Level among Middle Aged Men

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Abstract: ***The purpose of the study was to find out the influence of strength training on sugar level among middle aged men. Twenty middle aged men (n = 20) were randomly selected as subjects. The age of the subjects ranged from 40 to 55 years. The subjects divided into two equal groups of ten subjects each (n = 10). In which, the group I underwent strength training (STG) for three days per week for eight weeks and group II acted as a control (CG) who did not undergo any special training programme apart from their regular activities. Fasting blood sugar level was taken as variable for this investigation. Analysis of covariance (ANCOVA) was used to analyze the collected data. The results revealed that the strength training group (STG) produced significant reduction (p ≤ 0.01) due to strength training on fasting blood sugar level when compared to control group (CG).***

Keywords: Strength training, fasting blood sugar, middle aged men

1. Introduction

Strength training is an exercise programme whether free or stationary weights are used for the purpose of increasing muscular strength, muscular endurance and power through which skills can be improved (Moran & McGlynn, 1997). The resistance is an attempt to bring about adaptation in tension dependent neural mechanisms that inhibit the excitation of motor neurons in voluntary maximal contradictions. Resistance training refers to strength training performed primarily to ei enhance a person's appearance, symmetry, strength and well being (Bean, 1997). It is an anaerobic form of exercise (Teng *et al.* 2008). It is caused to enhance the ability of the body to perform at very high force or power for a very short period of time (Baechle, 1994). While the literature supports the efficiency of resistance training two or three times per week (Ramsay *et al*., 1990).

Glucose is transported from the intestines or liver to body cells via the bloodstream, and is made available for cell absorption via the hormone insulin, produced by the body primarily in the pancreas. Its measurement is important to the diagnosis of diabetes mellitus. The prime source of energy human cells is glucose which is a kind of sugar which passes through the blood system. Blood sugar is a test for the levels of glucose in blood. Glucose is the primary source of energy for the body's cells, and blood lipids (in the form of fats and oils) are primarily a compact energy store (Hayashi *et al*., 1997). When eat carbohydrates, glucose goes through body. The levels of glucose are kept normal by glucagon and insulin. Insulin is the hormone which is generated in the pancreas and discharged into the blood system when levels of glucose rise. Resistance training helps to improve the level of insulin generation (Anderson *et al*., 2003 & Henriksson, 1995). The "fasting blood glucose" test must have the individual fasting for at least 8 - 12 hours. Normal levels for this test are 70 to 100 mg/dl. Levels of blood sugar consistently higher than 150 mg/dl are a sign of high blood sugar also known as hyperglycemia. When the blood sugar level persistently falls to 70 are lower this is a sign of low blood sugar also know as hypoglycemia. Continual hyperglycemia causes diabetes mellitus, which is the most frequent disease connected to the regulation of blood sugar. Diabetes is a disease which can cause kidney, nerve and eye damage. Physical exercise helps to normalise blood sugar level and maintain health (WHO, 2008). The strength training helps to normalize the level of blood sugar (Jason et al., 2008).

2. Materials and Method

For this purpose twenty middle aged men from Thrissur District, Kerala, were randomly selected as subjects. Their age were ranged between 40 and 55 years. The selected twenty subjects were divided into two groups of ten each. Out of which, group I (n = 10) underwent strength training and group II (n = 10) remained as a control. The groups were one experimental group (STG) and one control (CG). During the training period, the experimental group underwent their respective training programme for eight weeks 3 days per week and a session on each day. The control group (CG) did not participate in any specific training apart from their regular activities. Moderate intensity (60-70%) of strength was used in this experimentation. Fasting blood sugar was selected as dependent variable for this study. It was measured by enzymatic glucose oxidase preoxidase (GOD-POD) method using Boehringer Mannheim kit. These are the exercise were used as a strength training, bench press, squat, push press, heel raises, arm curl, leg curl, leg press, military press, medicine ball exercise and sit ups.

Data analysis

Mean and standard deviation were calculated for fasting blood sugar for training group. And the data were analyzed by using analysis of covariance (ANCOVA). Statistical significance was set to priority at 0.01.

3. Results

Table 1: Analysis of covariance for Blood Sugar of experimental groups and control group

Test		*STG*	*CG*	*SOV*	*SS*	*df*	*MS*	*F*
Pre test	Mean	111.7	107.7	B	80	1	80	1.13
	S.D.	5.83	10.39	W	1278.2	18	71.01	
Post test	Mean	92.3	108.2	B	1264.05	1	1264.05	18.75*
	S.D.	5.21	10.38	W	1213.7	18	67.43	
Adjusted Post test	Mean	92.58	107.92	B	1106.12	1	1106.12	15.83*
				W	1187.93	17	69.88	

*Significant F (df 1, 18) (0.01) = 8.28; ($p \leq 0.01$) F (df 1, 17) (0.01) = 8.40; ($p \leq 0.01$)

The table I showed that the pre test mean values on blood sugar for strength training group and control group were 111.7 and 107.7 respectively. The obtained *F* ratio of 1.13 for pre test which was lower than the required table value 8.28 with df 1 and 18 at 0.01 level of confidence. The post test mean values for physical exercise group and control group were 92.3 and 108.2 respectively. The obtained *F* ratio of 18.75 for post test which was higher than the required table value 8.28 with df 1 and 18 at 0.01 level of confidence. The adjusted post test mean values on blood sugar for strength training group and control group were 92.58 and 107.92 respectively. The obtained *F* ratio of 15.83 for adjusted post test which was higher than the required table value 8.40 with df 1 and 17 for significance at the 0.01 level of confidence on blood sugar level. The pre, post and adjusted post test mean values of experimental group and control group on blood sugar was graphically represented in the figure 1.

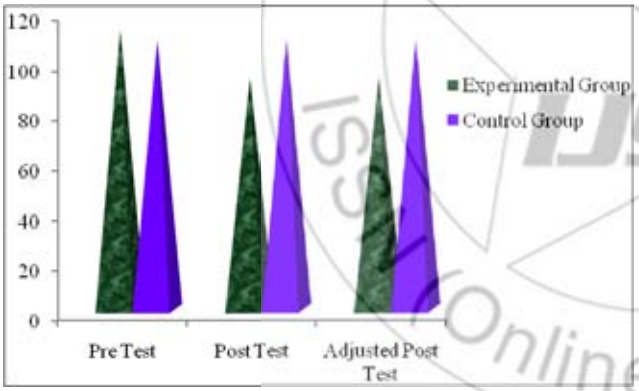

Figure 1: The pre, post and adjusted post test mean values of experimental group and control group on blood sugar

4. Discussion

The result of the present study indicated that there was a significant reduction on fasting blood sugar of middle aged man at 0.01 level. The strength training has been shown to increase insulin sensitivity, decrease glucose intolerance (Sundell, 2011 & Neil *et al.,* 2006). High blood glucose and high insulin levels can also have a deleterious effect on hypertension and blood lipids (Hurley, 1994). Mark *et al*., (2009) reported that strength training significantly reduced basal insulin levels and area under the insulin response curve following glucose ingestion. The decrease in insulin was significantly correlated with increase in lean body mass. Hurley et al. (1988) reported that insulin response to an oral glucose tolerance test was significantly lower following 16 weeks of resistance training. Improvements in glucose metabolism with strength training, independent of alterations in aerobic capacity or percent body fat, have been shown (Hurley *et al*., 1988). Interestingly, Smutok et al. (1993) and Irvin & Taylor (2009) concluded that strength training and aerobic training improved glucose tolerance and reduced insulin responses to oral glucose similarly. Miller *et al*., 1984 and Anson *et al*., 2008 point out that the strength training differentially affects weight loss and glucose metabolism.

5. Conclusion

It is concluded that the fasting blood sugar level can be decreased during the age between 40 and 55 years of middle aged men and favour the prescription of moderate intensity strength training during the initial adaptation period. Finally, the studies presented in this review demonstrate that there was a significant difference on blood sugar due to eight weeks of moderate intensity strength training as compared to control group.

References

[1] Andersen, J.L., Schjerling, P., Andersen, L.L., & Dela F. (2003). Resistance training and insulin action in humans: effects of detraining. *Journal of physiology,* 551:1049–1058.
[2] Baechle Thomas, R. (1994). *Essential of Strength Training and Condition,* Champion: Human Kinetics, p. 21.
[3] Bean, Anita. (1997). *The Complete Guide to Strength Training.* London: A and C Black Publishers Ltd.
[4] Hayashi, T., Wojtaszewski, J.F., & Goodyear, L.J. (1997) Exercise regulationof glucose transport in skeletal muscle. *American Journal of Physiology*, 273: e1039–e1051.
[5] Henriksson, J. (1995). Influence of exercise on insulin sensitivity. *Journal of Cardiovascular Risk*. 2: 303–309.
[6] Hurley, B. (1994). Does strength training improve health status? *Strength and Conditioning*, 16, 7-13.
[7] Hurley, B. F., Hagberg, J. M., & Goldberg, A. P. (1988). Resistive training can reduce coronary risk factors without altering VO2max or percent body fat. *Medicine and Science in Sports and Exercise*, 20, 150-154.
[8] Irvine, C., & Taylor, N.F. (2009). Progressive resistance exercise improves glycaemic control in people with type 2 diabetes mellitus: a systematic review. *Australian Journal of Physiotherapy*, 55, 237-246.

[9] Jan Sundell. (2011). Resistance Training is an effective tool against metabolic and frailty syndromes, *Advances in Preventive Medicine*, p.7.
[10] Jason, J. Winnick., Trudy Gaillard., & Dara, P. Schuster. (2008). Resistance training differentially affects weight loss and glucose metabolism of white and african american patients with type 2 diabetes mellitus, *Ethnicity & Disease,* Volume 18.
[11] Mark, A. Tresierras., & Gary, J. Balady. (2009). Resistance training in the treatment of diabetes and obesity, Mechanisms and outcomes, *Journal of Cardiopulmonary Rehabilitation and Prevention,* 29: 67–75.
[12] Miller, W. J., W. M. Sherman., & J. L. Ivy (1984). Effect of strength training on glucose tolerance and post-glucose insulin response, *Medical Science and. Sports Medicine*. 16: 539-543.
[13] Moran, Gary T.., & George, H. McGlynn. (1997). *Cross Training of Sports.* Champaign: Human Kinetic Publishers, p. 29.
[14] Neil, D. Eves., & Ronald C. Plotnikoff. (2006) , Resistance training and type 2 diabetes, Considerations for implementation at the population level , *Diabetes Care August,* vol. 29: No. 8 , 1933-1941.
[15] Ramsay, J., Blimkie, C., Smith,k, K., Garner, S., & MacDougell, J. (1990). Strength training effects in prepubescent boys, *Medicine & Science in Sports & Exercise*, 22, pp.605-614.
[16] Smutok, M. A., Reece, C., & Kokkinos, P. F. (1993). Aerobic vs. strength training for risk factor intervention in middle-aged men at high risk for coronary heart disease. *Metabolism*, 42, 177-184.
[17] WooMei Teng., Chen Chee Keong., Ashok Kumar Ghosh., & Visvanathan Thimuryan. (2008). Effects of a resistance training programme on isokinetic peak torque and anaerobic power of 13 – 16 years old teakwondo athletes, *International Journal of Sports Sciences and Engineering,* Vol. 2, No. 2, pp. 111-121.
[18] World Health Organization. (2008). Global strategy on diet, physical activity, and health. *Diabetes*. September 27.