EFFECT OF STEP AEROBICS ON RESTING METABOLIC RATE OF OBASE FEMALE NURSES IN BAUCHI SPECIALIST HOSPITAL BAUCHI, BAUCHI STATE NIGERIA.

By

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Abstract

The study was conducted to assess the effect of step aerobics on skeletal muscle mass of obese female nurses in Specialist Hospital, Bauchi, Bauchi State. To achieve this purpose, hypothesis was postulated and tested at 0.05 level of significance. A pretest and posttest experimental design was used for the study. The population of the study comprised of sixty-two (62) female nurses in Specialist Hospital Bauchi. A sample size of 20 obese female nurses were drawn from the population using purposive sampling technique. The participants were exposed to 12 weeks' step aerobics, on 3 alternate days per week, the training programme lasted 30minutes for the 1th - 4 thweek, increased to 35 minutes 5 th - 8th and 40 minutes in last four weeks at 45% - 60% of HRmax. Omron (BF511) body composition monitor was used to assess the participants. The collected data was analyzed using student t-test. The result of this study revealed that step aerobics step aerobics had significant effect on resting metabolic rate ($p = 0.000$) of female nurses in Specialist Hospital Bauchi. On the basis of the result of this study, it was concluded that Step aerobics had positive impact on resting metabolic rate of obese female nurses in Specialist Hospital Bauchi, Bauchi State. Obese female nurses should be enlightened through public lectures by exercise and sport science specialist on the need to perform regular step aerobics to burn down excess body fat. Based on the finding of the study the researchers recommended that obase female nurse should be enlightened through public lecture by exercise and sport science specialist on the need to perform regular step aerobics to improve their resting metabolic rate.

Key words: step aerobics, resting metabolic rate and obese female nurses

Introduction

All living organisms spend energy attempting to maintain cellular homeostasis, energy consumption in humans may be divided in to three parts: the energy consumed at rest accounts for 60%- 75% of the total daily energy expenditure, the thermal effect of food (10%) and physical activity (15-30%) (Antunes, Santos, Boscolo, Bueno and Mello,

2005).Tremblay (2010) and Hoops (2011) in their studies indicated that a significant relationship exists between body composition and resting metabolic (RMR) rate and that individual variation in RMR is primarily attributable to the amount of lean mass, which explains a much greater fraction of the variance in BMR. In a separate study by Ocan, Kinabo, Mamiro and Nyaruhucha (2013) found out that body weight, height, free fat mass has significant influence on RMR. Furthermore, for any giving RMR, there is a direct link to weight of an individual since RMR contributes 60%-70% of one's energy expenditure.

Resting metabolic rate is a measure of basic biological energy needs and is commonly used to predict daily energy requirements of an individual (Speakman & Selman 2003,). As viewed by Antunes, Santos, Boscolo, Bueno and Mello, (2005), resting metabolic rate (RMR) measures the minimum amount of energy required to maintain physiological functions at rest. RMR is the amount of energy released from a resting subject per unit time, the released and utilization of energy for the functioning of vital organs (, Alawad Merghani & Ballal, 2013). Increased physical activity increases total energy expenditure associated with increased muscle mass and decreased adiposity (Uygur, Ucok, Gene, Sener, Uygur &Songur, 2013). Therefore, an increase in resting metabolic rate in response to exercise intervention assists in overcoming the low energy expenditure attributed to onset and persistence of weight gain. Physical exercise done regularly have positive effects on resting metabolic rate and healthy life of adults. Research studies have demonstrated positive effect of aerobic oriented training on fat oxidation and calorie expenditure, which can directly influence changes in body composition (Kozakiewie, Sawezyn, Zarebska, Kwitniewska & Szumilewiez, 2013). There has been a growing concern with studying resting metabolic rate due to its relation with the risk of fat mass gain, particularly for seniors, since a low metabolic rate may contribute to the prevalence of high rates of overweight and obesity (Antunes, et al, 2005). An intervention which will significantly alter RMR may have a substantial effect on energy balance; the argument has been posited that increase in RMR in response to exercise intervention could assist in overcoming the low energy expenditure attributed to the onset and persistence of obesity (Speakman and Selman, 2003). Furthermore, the magnitude of change that has been reported in studies showing an exercise related difference in RMR varied according to the population measured and the mode of training employed. Resistance training study was conducted on 13 healthy men aged 50-65 years, after 16 week of strength training found that RMR had increased by 7.7% (13kcl per day $p<0.01$) (Pratley et al, 1994). In a study conducted by Antunes, et al, (2005) significant reduction in basal metabolism was observed in the experimental group, after 6 months of aerobic exercise. A significant difference was found between the pre- and posttest values for body weight, BMI, fat percentage and resting metabolic rate of the experimental group ($p<0.05$) after 8 weeks of step aerobic dance (Arslan, 2011). Chakmackci, Arslan, Taskin & Cakmackci (2011) found significant reduction in resting metabolic rate of sedentary women after 8 weeks of aerobic dance. There was a significant difference between pre- and post-test values resting metabolic rate and metabolic rate ratios for women in menopause who

participated in the exercise (Duman, 2013). This implies that aerobic exercise influences the rate of energy expenditure in our daily living.

Bioelectrical impedance analysis (BIA) is a popular alternative to assess body composition because is a safe, non-invasive and portable. It measures resistance and estimate body fat by combining measures with height, weight, gender and age that provide total body fatness and regional estimates of fat (Sanclez, Falo, Navarro, Aza 2010; Ayvaz & Cimen, 2011 & Lockwood, 2013).

Obesity has emerged as one of the most serious public health concerns of the industrial age. The global increase in obesity has raised interest in the complex causes of excessive weight gain, which can be seen as the consequence of a sustained increase in energy intake relative to energy expenditure that is characterized by the accumulation of excess body fat and can be conceptualized as the physical manifestation of chronicexcess energy (Uygur, et al, 2013).A healthy body requires a minimum amount of fat for the proper functioning of the hormonal, reproductive, and immune systems. On the contrary, when there is an excessive accumulation of body fat, (an individual becoming overweight or obese) leads to adverse health effects (Mengistie, 2013). In addition, obesity is a serious public health problem in both developed and developing countries of the world including Nigeria.

Step aerobics is a variety added in dance aerobics which makes it extremely challenging, one lose calories; adds excitement to the exercise and provides sufficient cardiorespiratory demand to enhance aerobic fitness and improved general wellbeing of an individual (Arslan,2011). This study was therefore designed to assess the effect of step aerobics on resting metabolic rate of obese female nurses in specialist hospital Bauchi, Bauchi state, Nigeria.

The main purpose of this study was to investigate the effect of step aerobics on skeletal muscle mass of obase female nurses in specialist hospital Bauchi, Baauchi State. Specifically, the study sought to assess the effect of step aerobics on skeletal muscle mass of obase female nurses in specialist hospital Bauchi, Bauchi State, Nigeria.

Hypothesis

The researchers hypothesized that ***there is no significant effect of step aerobics training on*** resting metabolic rate ***of obese female nurses in Specialist Hospital Bauchi, Bauchi State, Nigeria.***

Methodology

A pre-test and post-test design was employed for this research. The participants were tested at baseline and were exposed to treatment (step aerobics) for 12 weeks and were tested after the treatment (post-test). The population of the study consisted of sixty-two (62) female nurses in Specialist Hospital Bauchi. Purposive sampling technique was used

to select fifteen (15) obese female nurses through assessment of individual participants BMI using body composition monitor. The nurses whose BM1was between 30.0 and 39.99 kg/m^2 (obesity class 1and 11) (WHO, 1999; Guideline and Protocol Advisory Committee, 2011), were used as respondents for the study after agreeing and signing the consent forms. Body Composition Monitor (model BF 511, made by OMRON, Japan) was used to assess percentage body fat and visceral fat of the respondents.

The training lasted for 12 weeks, 3 days per week and between 30 to 40 minute per session and the intensity of the training programme was adjusted based on maximum heart rate (220 – age = maximum heart rate) the intensity progressively increased as follows:
1^{1st} to 4th week, training intensity was maintained 45% - 50% of Hrmax.
5^{th} to 8^{th} week, training intensity was maintained at 50% -55% of Hrmax.
9^{th} to 12^{th} week, training intensity was maintained at 55% - 60% of Hrmax

Table 1. Training Programme

Week	Intensity	Warm up/ Stretches	Aerobic session	Cool down	Total time	RPE
1^{IST} to 4^{th}	45% - 50% HRmax	5 min	20 min	5 min	30 min	Light
5^{th} to 8^{th}	50% - 55% HRmax	5 min	25 min	5min	35 min	Moderate
9^{th} to12^{th}	55% - 60% HRmax	5 min	30 min	5 min	40 min	Somewhat Hard

The data collected for this study was analysed using descriptive statistic of means, standard deviations and standard error of estimate to analyse the physical characteristics such as age, height and weight of the participants to give information about the dispersion and the variation of the of data. Student t – tests (paired t – test) was used to analyse the post-test effect of step aerobics on the assessed variables of the study. Decision to reject or retain the null hypotheses was made at an alpha level of 0.05.

Results

Information on the physical characteristics of the participant before the commencement of the training is presented in table 2

Table 2: Physical Characteristic of the Participants

Variable	Mean	SD	SE
Age (yrs)	31.083	7.50	2.17
Height (m)	1.617	0.066	0.02
Weight (pre) (kg)	90.68	6.423	1.85

Table 2: shows the physical characteristics of the participants, mean age of the participants was 31.083±7.50 years with an average height and weight of 1.6170.066m, and 90.686.423kg respectively. Data collected at base line (pre-test) and after 12thweeks (post-test) of step aerobics on resting metabolic rate (RMR) of obese female nurses in Specialist Hospital Bauchi. The baseline and post-test descriptive statistics of the data is presented in table 3.

Table 3Mean, Standard Deviation and Standard Error of Pre and Posttest scores of Resting Metabolic Rate of the participants

Pretest					Posttest		
Variables	N	Mean	S.D	S.E	Mean	S.D	S.E
RMR	12	1678.58	155.77	44.97	1672.00	155.96	45.02

Key: BF = RMR = Resting Metabolic Rate

Table 3 show the pre and posttest mean, standard deviation and standard error of resting metabolic rate of the participants used in this study. An observation of this table revealed that RMR decreased from 1678.58 ± 155.77 to 1672.00±155.96 .

Table 4 Paired t-test Analysis of the Pre and Post Test Effect of Step Aerobics Training on Resting Metabolic Rate of Obese Female Nurses

Variable	Test Period	Mean	SD	DF	T	P
	Pre test	1678.58	155.77			
RMR				11	8.208	0.000
	Post test	1672.0	155.96			

t (11)=2.201 P≤0.05

Table 4.2.6 shows t-test analysis of pre-test-post-test effect of step aerobics on RMR of obese female nurses. An observation of this result revealed that step aerobics had significant effect on resting metabolic rate (RMR) of obese female nurses in Specialist Hospital Bauchi (P 0.000), Hence, the null hypothesis which states that there is no significant effect of step aerobics training on resting metabolic rate of obese female nurses in Specialist Hospital Bauchi is rejected.

Discussion

Physical activities have impact on energy expenditure due to its effect on resting metabolic rate. In the present study, 12 weeks' step aerobics had significant effect on resting metabolic rate of obese female nurses in Specialist Hospital Bauchi ($p= 0.000$). This result supports the result of Antunes, et al (2005) who observed that aerobic exercise had significant effect on resting metabolic rate of obese adults of the experimental group. The result also agreed with that of Arslan (2011) who found that there was significant effect of 8 weeks of aerobics on resting metabolic rate of the experimental group. The findings also corroborate with the study of Chakmakci, et al (2011) who found significant effect of 12 weeks' aerobic dance on resting metabolic rate of over weight/obese women ($p<0.05$). This study supports the study of Chakmackci, et al (2011) found significant reduction in resting metabolic rate of sedentary women after 8 weeks of aerobic dance ($p< 0.05$).This study also supports the study of Duman (2013) who observed significant effect of aerobic exercise on resting metabolic rate of obese women. This it implies that step aerobics is an effective mode of reducing resting metabolic rate of obese female nurses.

Conclusion

Step aerobics had positive impact on resting metabolic rate of obese female nurses in Specialist Hospital Bauchi, Bauchi State.

Recommendation

Based on the finding of the study it is recommended that obese female nurses should be encouraged to participate in Step aerobics at least three times a week and not less than 30 minutes per session by exercise and sports science specialist as a mode of exercise for fitness and improvement of the general health.

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