Effect of Brisk Walking on Selected Indices of Obese Female Adult (Study in Kaduna Metropolis, Nigeria)

Saiwo O. E.¹, Gunen E.A.², Aliyu M.³ & Chado M. A.⁴

¹Department of Physiotherapy, Barau Dikko Teaching Hospital, Kaduna
²,⁴Department of Human Kinetics and Health Education, Ahmadu Bello University, Zaria
³Department of Human Physiology, Ahmadu Bello University, Zaria
Nigeria

Abstract:
Background: Correction of body weight reduces the incidence and severity of comorbid diseases. A key aspect to this end is a significant amount of physical activity that is appropriately supervised and quantified.

Objectives: This study was conducted to assess the effect of brisk walking on selected indices of obese female adults in Kaduna metropolis, Nigeria.

Methodology: Quasi experimental research design was used for this study. Using purposive sampling, 17 obese female adults with body mass index between 30.0 and 39.9 kg/m² and ages of 40 - 50 years who met the inclusion and exclusion criteria were selected for this study. There were 3 attritions leaving 14 participants for the study. The participants were subjected to, brisk walking for 30-50 minutes with 10 and 5 minutes of warm up and cool down activities respectively. The exercise programme was conducted on 3 alternate days per week for 12 weeks. Body weight, height, waist circumference and percent body fat were measured at base-line, immediately after the 6th and 12th week of training period. The descriptive statistics of mean, standard deviation and standard error of means were used to analyse the data of the physical characteristics of the participants. Repeated-measures ANOVA was used to assess the effect of training on all the assessed variables while post hoc Bonferroni Multiple comparison was used to evaluate the effect of the training on the variables. The null hypotheses raised for this study were tested at 0.05 alpha levels.

Results: The results of this study revealed that brisk walking significantly reduced the total body weight, body mass index, waist circumference and percent body fat (P = .000) of the participants.

Conclusion: It was concluded that brisk walking significantly reduced the total body weight, body mass index, waist circumference and percent body fat of obese female adults in Kaduna metropolis, Nigeria.

Keywords: Brisk walking, Body mass index, waist circumference, Percent body fat & obese female adults.
1. Introduction

Life-style is generally considered a personal issue. However, World Health Organization (WHO, 2016b), reported a strong correlation between mortality rate and lifestyle practices globally. One of such lifestyle practices is physical inactivity or sedentary living which was highlighted as one of the causes of obesity, leading to metabolic and cardiovascular diseases (Ding, Rogers, Van der Ploeg, Stamatakis & Bauman, 2015; WHO, 2016b). Experts in nutrition stressed that obesity is difficult to define qualitatively; but it is generally accepted that anyone who has a body mass index (BMI) equal to or greater than 30kg/m² is obese (Kent, 2005; WHO, 2016b).

More people in developing countries now die from obesity-associated diseases, including ischemic heart disease, diabetes mellitus and cancer (Akarolo-Anthony, Willett, Spiegelman & Adebamowo, 2014). Body fat expressed as percent body fat is strongly associated with the risk of chronic diseases such as hypertension, dyslipidemia, diabetes mellitus, and coronary heart disease (Dehghan & Merchant, 2008. The medical risk of obesity is highly associated with the distribution of body fat, and abdominal fat is considered at least as an important medical risk as the total amount of body fat. Body Mass Index and waist circumference (WC) are used to classify obesity and the risks of abdominal fat accumulation (Vazquez, Duval, Jacobs, & Silventoinen, 2007; Kavak, Pilmane & Kazoka, 2014).

There is an increasing trend of overweight and obesity among adults in developing countries of the world which makes it a major health problem. Data from the World Health Organization shows that the prevalence of overweight and obesity increased by 20% between 2002 and 2010 in Nigeria (Akarolo-Anthony et al, 2014). World Bank Gender Statistics (2015) also, reported increased statistics of obese women from 13.4% in 2010 to 16.3% in 2014 in Nigeria. Other studies have also shown higher incidence of obesity among females than males in Nigeria (Wahab, Sani, Yusuf, Gbadamosi, Gbadamosi, & Yandutse, 2011; Banwat, Chingle, Lar, Damib & Zaakah, 2012; Adebayo, Balogun, Adedoyin, Obas horo-John, Bisiriyu & Abiodun, 2014; Fadupin, Adeoye, & Ariyo, 2014). Reports from various population sub-groups in Nigeria as described by Iloh, Amadi, Nwankwo, Ugwu and (2011) in Imo State, Wahab et al. (2011) in Katsina State, Adebayo et al. (2014) among adults in Osun State, Akarolo-Anthony et al. (2014), of a government worksite in Abuja and Banwat et al. (2015) in Jos, showed obesity predominance among adult aged 40 years and above with class 1 obesity as the most prevalent followed by class 2 obesity.

Although several research studies have been reported on the prevalence of obesity in Kaduna, there is paucity of information on its management (Adaramaja & Olanrewaju, 2008; Shehu, Abdullahi & Adekeye, 2010; Oladimeji, Fawole, Nguku & Nsubuga, 2012; Dahiru & Ejembi, 2013). A study conducted among civil servants in Kaduna State reported 27% prevalence of obesity with women four times more obese than the men (Oladimeji et al., 2012). Lack of regular exercise has been identified as a major cause of obesity in Kaduna State (Adaramaja & Olanrewaju, 2008; Shehu et al., 2010).

Excess or reduced body weight is regarded as an indicator of determining an individual’s health. Moderate weight loss (~10-15% or 4.5-9.1 kg) can assist in achieving metabolic goals (Albright, Franz, Hornsby, Kriska,, Marrero, Ulrich, Verity, 2010). American College of Sports Medicine, (2015) reported that aerobic training has the potential of altering anthropometric and body composition of adults. It was recommended that adults should get at least 150 minutes of moderate intensity exercise per week (ACSM, 2018). Aerobic exercise is believed by many exercise scientists to be the single best predictor of weight maintenance. Aerobic exercise reduces weight and improved cardiopulmonary fitness in obese subjects better than anaerobic exercise (Al Saif & Alsennany, 2015). Aerobic exercise includes any rhythmic activity involving large muscle groups that elevate the heart rate for a sustained period (Rogers, 2015). These include walking, running, swimming, jumping, cycling, rowing, rope skipping and many such activities. Though the principles of aerobic exercise are the same for everyone, someone who is obese may find certain forms of aerobic exercise unrealistic (Rogers, 2015). For instance, high-impact activities, such as running and jumping may be uncomfortable or stressful to the joints of obese adults, while walking, swimming, cycling or using an elliptical trainer might be better choices for starting regular exercise for this group of persons (Rogers, 2015).

Walking at a pace of 5.7 km/h, Borg scale of perceived exertion 11 – 14 is considered brisk walking, and it is a popular and convenient form of exercise that plays an important role in weight
management and it is often recommended for obese individuals because it increases energy expenditure (Melam, Alhusaimi, Buragadda, Kaur & Khan, 2016). There is a paucity of reports on the association of brisk walking and obese adult women of Kaduna State. Likewise, there are no published perspective data on the association. This study was conducted to evaluate the effect of brisk walking on selected indices of obese female adult in Kaduna metropolis, Nigeria.

2. Methodology

A quasi-experimental research design was used in this study. The population for this research study was obese female adults in Kaduna metropolis. The study subjects were recruited using postal notices and direct contact within Kaduna metropolis. Using the purposive sampling technique, seventeen (17) female volunteers from Kaduna metropolis that met the inclusion criteria (female whose BMI was between 30.0 - 39.9 kg/m² and between the ages of 40 to 50 years) and on the basis of personal interest and availability for the programme, were included in the study (Iloh, et al, 2011; Wahab et al, 2011; Adebayo, Balogun et al, 2014; Akarolo-Anthony et al, 2014; and Banwat et al, 2015) reported obesity predominance among adult aged 40 years and above with class 1 obesity as the most prevalent followed by class 2 obesity. The exclusion criteria for the study included those women that were pregnant and having history of uncontrolled metabolic and cardiovascular diseases such as hypertension, coronary heart disease, type 2 diabetes mellitus, as well as those on medications affecting metabolism like steroids. Informed consent was sought and gotten from the participants and ethical committees of Ahmadu Bello University Zaria (Approval No: ABUCUHSR/2017/002) and Barau Dikko Teaching Hospital, Kaduna, Kaduna State (Reference No: 17-0020-1).

Measurements were taken for TBW, BMI, WC, and percent body fat at baseline, at the end of the 6th and 12th weeks. Training Protocol is as presented in table 1.

Total body weight, BMI and percent body fat: were measured using Omron Full Body Sensor Body Composition Monitor and Scale fitness indicator. It is a device that works by measuring the way the body conducts electricity according to the Bioelectric Impedance Analysis (BIA) method.

Height: Health Scale, Model ZT 150A, made in England by Harris was used to measure the participant’s height. Each participant was ensured to dress in very light clothes. Each was made to stand on the platform erect, bear footed and facing forward with the buttocks having contact directly with the machine. The overhead rule was adjusted to the highest point of the participant head (the vertex). The participant then dismounted the machine while the reading was taken and recorded in centimeters. The measurement in centimeters was later converted to meters.

Waist Circumference: A non-elastic tape, (Model X635, 1-150 cm) made in China was used. Each participant waist circumference (WC) was measured in horizontal plane with each subject standing erect using non-elastic tape. Measurements were taken on the right side of the body at the greatest anterior extension of the abdomen usually at level of the umbilicus in centimeter (ACSM, 2013). To ensure accuracy, the tape was held at zero end with the left hand and positioned snugly below the other part of the tape which was held with the right hand. Measurements were taken at the end of normal expiration to the nearest 0.1 cm. Each participant maximum heart rate (HRmax) was determined using the formula: 220 – age.
During the initial 4 weeks of training, the participants trained at intensity levels of between 50 and 55% maximum heart rate, which was monitored using Borg’s scale rating of 9 – 11 (very light) and heart rate monitor, three times per week for a duration of 45 minutes (10 minutes warm-up and 5 minutes of cool-down and 30 minutes brisk walking). Between the 5th and 8th week, the training intensity level was maintained between 55 and 60% maximum heart rate which was monitored using the Borg’s scale rating of 11 -13 (light), three times per week and for a duration of 55 minutes (10 minutes warm-up and 5 minutes of cool-down and 40 minutes brisk walking). Likewise, between the 9th and 12th weeks, the training intensity was further increased to 60 and 65% maximum heart rate using Borg’s scale 13 - 15 (somewhat hard) at a duration of 65 minutes (10 minutes warm-up and 5 minutes of cool-down and 50 minutes main training). The increases in the intensity levels and durations were in line with the recommendations of Matthew and McQueen, (2009); Heyward, (2010) & Ehrman, Gordon, Visich, and Keteyian, (2013).

During the exercise, care was taken by the participants, the researcher and the research assistants to ensure prompt identification of signs and symptoms of exhaustion, such as weakness, dizziness, chest pains, shortness of breath, palpitations, nausea. This was with the view to stop any participant from further exercising to prevent collapse. Since obese individuals are susceptible to dehydration, water was made available by the researcher before, during and after the workout (ACSM, 2013).

Data were analyzed using descriptive statistics of means, standard deviation and standard error. Repeated-measures Analysis of Variance (ANOVA) was used to determine the interactional effect of the training on the variables. While Post-hoc using Bonferroni Multiple comparisons was used to determine where the effects of the training duration lies. The null hypotheses were tested at 0.05 alpha levels.

3. Results

Seventeen (17) participants were recruited for this study. The study started with seventeen (17) participants but there were three attritions between base-line and the sixth week of the training programme. One of the participants dropped out because of frequent trips on political engagement, one stopped on medical ground while the third participant dropped out due to time incompatibility. The training lasted for 12 weeks with exercise intensity between 50% and 65% of maximum heart rate for duration of training session lasting between 45 and 65 minutes on three alternate days per week. Data were collected at base-line, immediately after the 6th and 12th weeks of training on all the variables for the remaining fourteen (14) participants. The demographic data of the participants on age, height and weight is presented in Table 2.
The findings of this study revealed significant decrease in the total body weight after 12 weeks of brisk walking. In line with this, a study conducted to investigate the effect of moderate intensity walking program on weight maintenance in premenopausal obese women resulted in accelerated weight loss and decrease the waist circumference (Fogelholm, Kukkonen-Harjula, Nenonen & Pasanen, 2000). Also, a study was conducted on regular exercise of brisk walking on selected indices of obese female adult in Kaduna metropolis, Nigeria.

The findings of this study revealed significant decrease in the total body weight after 12 weeks of brisk walking. In line with this, a study conducted to investigate the effect of moderate intensity walking program on weight maintenance in premenopausal obese women resulted in accelerated weight loss and decrease the waist circumference (Fogelholm, Kukkonen-Harjula, Nenonen & Pasanen, 2000). Also, a study was conducted on regular exercise of brisk walking on selected indices of obese female adult in Kaduna metropolis, Nigeria.

Table 2: Demographic Data of the participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>14</td>
<td>47.643</td>
<td>2.437</td>
<td>.651</td>
</tr>
<tr>
<td>Height (m)</td>
<td>14</td>
<td>1.604</td>
<td>.668</td>
<td>.018</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>14</td>
<td>91.693</td>
<td>11.862</td>
<td>3.170</td>
</tr>
</tbody>
</table>

SD= Standard deviation and SE = Standard error

Table 3: Effect of 12 weeks of brisk walking on total body weight, body mass index, waist circumference percent body fat

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Baseline</th>
<th>6th week</th>
<th>12th Week</th>
<th>Anova P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>SE</td>
<td>M</td>
</tr>
<tr>
<td>TBW</td>
<td>14</td>
<td>91.693</td>
<td>11.862</td>
<td>3.381</td>
<td>90.379</td>
</tr>
<tr>
<td>BMI</td>
<td>14</td>
<td>35.493</td>
<td>2.990</td>
<td>.799</td>
<td>34.986</td>
</tr>
<tr>
<td>%B/F</td>
<td>14</td>
<td>50.357</td>
<td>4.742</td>
<td>1.267</td>
<td>48.607</td>
</tr>
</tbody>
</table>

M=mean, SD= standard error and SE= standard error , (p <0.05)

Table 3: presents the results of the effect of 12 weeks of brisk walking on total body weight, body mass index, waist circumference and percent body fat of the participants. An observation of the results showed that brisk walking significantly reduced the total body weight, body mass index, waist circumference and per-cent body fat of the participants (p <0.05). Post hoc tests using the Bonferroni correction confirmed this significant position for all the variables, There was significant decrease in the mean values between week zero and 6th week, between the 6th and the 12th weeks as well as between the zero week and the 12th week of brisk walking.

4. Discussion

Excessive body fat is associated with increased metabolic risk and its measurement is important in implementing curative and preventive health measures (Ranasinghe, Gamage, Katulanda, Andraweera, Thilakarathne and Tharanga, 2013). Lack of regular exercise training as been identified as among the major risk factors affecting normal body composition and anthropometric indices of an obese individual; (Adaramaja and Olarenwaju, 2008; Shehu et al., 2010; WHO 2010; WHO, 2016b. It is clear that increase in body fat affects health, however, regular exercise can help reduce body fat as well as protect against chronic diseases associated with obesity (ACSM, 2016). Physical activity is a vital part of a comprehensive weight loss and weight management programme (Melam et al., 2016). Exercise programme counteract the aberrant metabolic profile associated with obesity directly and through body fat loss (Irwin, Yasui, Ulrich, Bowen, Rudolph, Schwartz, Yukawa, Aiello, Potter & McTiernan, 2003).). Exercise increase the insulin sensitivity, stimulates fat metabolism and causes reduction in extra fatty weight (Irwin, et al, 2003). This study was designed to examine the effect of brisk walking on selected indices of obese female adult in Kaduna metropolis, Nigeria.
HRmax. Results reported that the difference in body weight and BMI values along with other body composition indices were statistically significant (p <0.05) (Zileli & Özkamçı, 2016).

The findings of this study also revealed significant decrease in the body mass index of obese female adults after 12 weeks of brisk walking. This is in agreement with Hong et al. (2014) whose study recorded significant effect of walking at 50-60% of each individual’s maximal oxygen uptake, 3 times per week for 12 weeks on visceral fat, BMI and waist circumference of middle aged Korean women. Azeem (2011) has also reported a significant reduction in BMI and waist and hip circumferences of obese males following a 12-week brisk walking programme at a frequency of 5 times per week, 45 min per session. This decrease may be attributed to the fact that brisk walking is an aerobic exercise that causes increase energy expenditure thereby creating energy balance for weight loss. The study finding was also in agreement with the findings of Shenbagavalli and Mary (2008), Marandi et al. (2013) and Zileli and Özkamçı (2016), who reported that moderate intensity walking reduces body mass index of obese women.

The result of this study equally showed that brisk walking had significant effect on waist circumference which was in line with the findings of Fogelholm et al. (2000) which showed that including a moderate-intensity walking programme in a weight maintenance program accelerated weight loss and decreased waist circumference. Melam et al. (2016) have also demonstrated that brisk walking for 45 min, 5 days per week for 10 weeks significantly reduced BMI, waist and hip circumferences of North Indian women. These findings corroborated with the work of other researchers; Brill et al. (2002) on Hispanic women, Hu et al. (2004) among middle aged Finnish women; NHS (2015) it was suggested that exercise is an effective tool in reducing waist circumference. The reduction of waist circumference is of particular clinical important since the increased risk of insulin resistance, diabetes, metabolic syndrome and mortality is associated with excess abdominal adiposity (Chen et al., 2016). Brisk walking was also observed to significantly reduce the percent body fat of obese female participants used in this study. Chaudhary et al. (2010) reported that both aerobic training at 60-70% of maximum heart rate and resistance training 3 times per week for 6 weeks resulted in a significant reduction of body fat percentage. In a research conducted to determine the effect of isolated walking training programme on percent body fat among obese female students from various departments of Annamalaiin University, Tamil Nadu, India; the results showed significant reduction in percent body fat, (Narayani et al., 2010). Another study also demonstrated a similar trend of reduction in percent body fat following 12 weeks of aerobic exercise (30 - min walking on the treadmill at 60% of heart rate reserve) (Ho et al., 2012). The results of this study further agreed with the reports of Marandi et al., 2013, Chen et al., 2016 and Melam et al., 2016) where beneficial effects of brisk walking on percent body fat were documented.

5. Conclusion

Studies have indicated that brisk walking and other aerobic exercise are the best methods for controlling and reducing weight (Ho et al., 2012, Marandi et al., 2013 and Melam et al., 2016). However, in spite of the significant effect of brisk walking on the variables in this study it was observed that the participants were still obese. This implies that short term body weight normalization is too aggressive a target and slow steady gains over time are more appropriate and realistic. Programs should target long-term weight reduction. Even limited levels of weight loss may have significant positive influences toward health improvement and risk factor management in the presence of hypokinetic diseases. Maintenance of exercise is a predictor of long-term weight management and of prevention of regain (Matthew & McQueen, 2009).

6. References


