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Comparative study between effects of treadmill walking and brisk walking on central obesity in obese and overweight men

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Abstract
Introduction: *According to the definitions of the World Health Organization Overweight and obesity have been described as abnormal or excessive fat accumulation which may impair health. The excess accumulation of abdominal fat (abdominal adiposity) is more associated with complications of the obesity than the excess total body fat. The addition of an exercise training program is a helpful strategy for the management of obesity and related complications. Brisk walking and treadmill walking are the simlplest way of aerobic exercises. Although physical activity and exercise are commonly recommended to reduce overall obesity, the effect of exercise-induced weight loss on abdominal adiposity has been yet to be investigated.*
Aim: *To compare the effect of treadmill walking and brisk walking on abdominal fat.*
Methodology: *40 obese and overweight otherwise healthy men with abdominal circumference >102 cm and BMI (kg/m^2) 25-40, age group 18- 40 years were selected for the study. Group – A (20 people did treadmill walking) and group – B (other 20 people did brisk walking) at a speed of 6kmph, 20min/day, 5day/week for 12 weeks. BMI and abdominal circumference were measured and compared before and after the training of 12 weeks.*
Results: *BMI of both groups is decreased but there was very little difference in decrease in BMI of both groups. Group B (brisk walkers) have slightly more decrease in abdominal circumference as compared to the group A (treadmill walkers).*
Conclusion: *Brisk walking is more effective way of reducing abdominal fat as compared to treadmill walking.*
Keywords: *BMI, Treadmill, obesity, brisk.*

Introduction

Worldwide obesity has nearly tripled since 1975. In 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 650 million were obese. 39% of adults aged 18 years and over were overweight in 2016, and 13% were obese.

Most of the world's population live in countries where overweight and obesity kills more people than underweight[1]. Overweight and obesity are described as abnormal or excessive fat accumulation which may impair health according to the definitions of the World Health Organization[2].The excess accumulation of abdominal fat (abdominal adiposity) is more associated with complications of the obesity than the excess total body fat[3]. This excess adipose tissue in the abdomen, especially around visceral organs, increases metabolic risk of cardiovascular disease (CVD) independent of the total amount of adipose tissue[4,5].Individuals with obesity have an increased risk of associated multiple health problems, including type 2 diabetes mellitus, hypertension, degenerative joint disease, dyslipidemia, and certain types of malignancies[6]. The addition of an exercise training program is a helpful strategy for the management of obesity and related complications. Current physical activity and exercise recommendations offer that the inclusion of aerobic exercise is essential for exercise programs for overweight & obesity management[7]. Although physical activity is commonly recommended to reduce overall obesity, the effect of exercise-induced weight loss on abdominal adiposity has been yet to be investigated[8].The direct relationship between different types of walking and a decrease in the visceral fat has not been searched as a primary target widely[9].

Aims and Objective

In the present study, we aimed to compare the effect of brisk walking and submaximal treadmill walking on central obesity in obese and overweight men.

Material and Method

The study was conducted on 30 overweight and obese otherwise healthy men at the department of physiology, IGIMS, Patna. Ethical clearance was taken from institute ethical committee of IGIMS, Patna. Inclusion and exclusion criteria were met for the selection of the participants.

Inclusion Criteria

- 40 healthy men
- Age group 18-40 years (34.70 ± 4.462).
- BMI (in kg/m2): 25– 40
- Waist circumference >102 cm.

Exclusion Criteria

- Age <18years &> 40 years
- BMI < 25 Kg/m²&>40 Kg/m²
- WC < 102cm
- H/O Cardiovascular disease
- H/O any medication known to affect electrical activity of heart or altering blood glucose level.
- H/O Thyroid disorder
- H/O Smoking
- H/O Sleep disorder
- H/O Menstrual abnormality
- H/O Neuropsychiatric disorder

Method

Anthropometric data of all participants i.e. height, weight, waist circumference were taken at the start & end of the study. All participants were devided into 2 groups – group-A & group – B. Participants of group A were motivated to do treadmill walking at a speed of 6 kmph at zero elevation for 20 min/ day, 5 days/week for 12 weeks in the day time. All participants of group B were motivated to do brisk walking at a speed of 6 kmph for 20 min/ day, 5 days/week for 12 weeks in the day time. Each study session was of 12 weeks duration. As recommended by the Centre for Health Protection, Hong Kongaerobic exercise should be done at least at moderate intensity, such as brisk walking (walk a mile, approximate 1.6 km in 15 to 20 minutes) at least 15 - 20 minutes of everyday.[10] Moderate intensity activity could be expressed as 50% to 70% of maximum heart rate. Maximum heart rate is estimated by "220 minus age"[11]. Physical activity like aerobic exercises are frequently classified by their intensity, using the MET as a reference[11,12]. The Metabolic Equivalent of Task (MET) refers to metabolic equivalent and 1 MET is the rate of energy expenditure while sitting at rest and it is taken by convention to be an oxygen uptake of 3.5 millilitres per kilogram of body weight per minute. Moderate activities are defined as 3.0 to 5.9 METs

(walking at 6 km/h requires 5 METs of energy expenditure).[11,13]

Pre and post exercise data were collected and analysed using SPSS software. Paired student T-test for comparison of means was used. Results will be expressed as Mean ± SD. P value <0.05 were considered as significant.

Results

It can be seen in table -1 that there was no statistical difference in all these anthropometric data viz. age, BMI and waist circumference among the treadmill walker and brisk walker groups, hence they are statistically comparable for the post study session measurements.

Table-1 Anthropometric data before the start of study session

	Treadmill walker	Brisk walker	P- value
Age	34.20 ± 5.82	34.93± 3.97	0.690
BMI	28.86 ± 2.40	30.23±2.28	0.119
WC	108.40 ± 3.06	108.20± 3.25	0.864

p- value > 0.05 (non significant)

After 12 weeks of the study session BMI and WC of all participants were measured. We applied paired student t-test for the comparison of pre and post test value of different groups. There was significant decrease in BMI & WC of both groups after 12 weeks of walking programme (table - 2). The percentage decrease in BMI of treadmill walker was 4.13 % (p value 0.000) while in brisk walker it was 6.07% (p value 0.000). The decrease in WC of treadmill walker was 2.27 %(p value 0.000) while the decrease in WC in brisk walker was 3.07 %(p value 0.000). So the decrease in both BMI and WC of brisk walker was more than the treadmill walker. when we applied pearson correlation between exercise and change in BMI, they were found strongly correlated (r = 0.681).we found exercise and change in WC also strongly correlated (r = 0.549).

Table-2 changes in variables among the groups

	variable	Pre test	Post test	P value
Treadmill walker	BMI	28.86	27.67	0.000
	WC	108.40	105.93	0.000
Brisk walker	BMI	30.24	28.39	0.000
	WC	108.20	104.87	0.000

P value <0.001 highly significant
<0.05 significant
>0.05 non significant

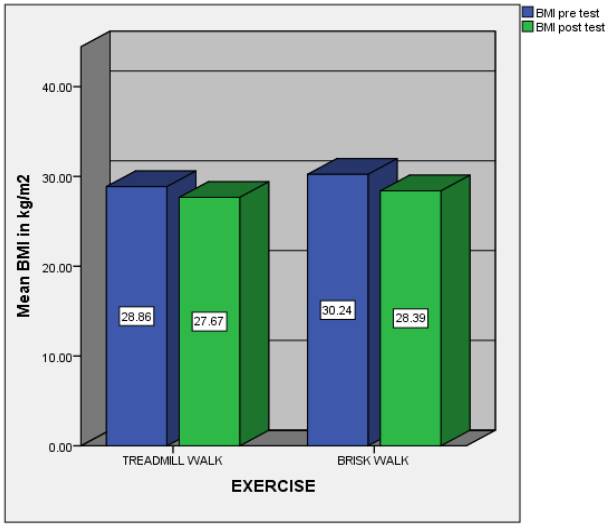

Fig.1 - Showing changes in BMI

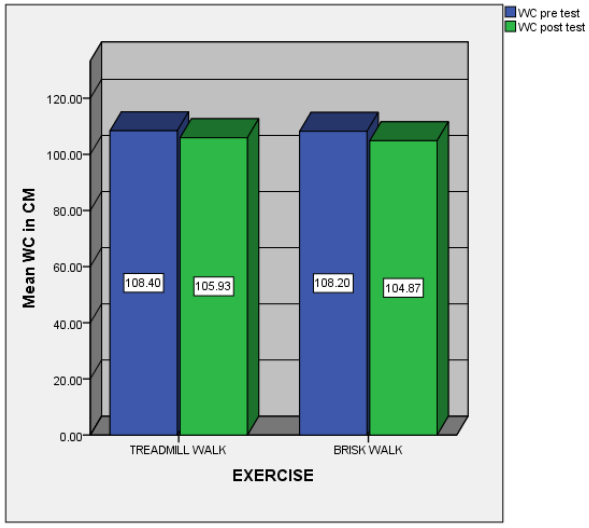

Fig.2 Showing changes in WC

Discussion

Several studies have demonstrated a positive association between obesity and metabolic risk factors, as well as an inverse association between fitness and metabolic risk[14,15]. These observations are largely limited to populations consisting of mainly normal weight, overweight and mild obesity [14,16]. Borodulin et al.[17] and Lee et al.[18] demonstrated that there was a stronger association between CRF and systolic blood pressure with increasing levels of adiposity.Physical inactivity is also well-known to be one of the major risk factors for heart diseases, cerebrovascular disease, diabetes mellitus, hypertension, some types of cancers and obesity in both men and women at any age[19].Studies have shown that interventions to promote regular physical activity are cost-effective in the prevention

and control of non-communicable diseases[20]. Current practice guidelines suggest inclusion of physical activity for 30 min/d on most days of the week as part of an overall obesity treatment program[21,22,23]. Individuals with obesity also suffer from low health-related quality of life (HRQoL)[24] and increased mortality [25] versus their healthy peers. Current physical activity guidelines [26,27] recommend 150 to >250 minutes per week of moderate-intensity continuous training (MICT) such as brisk walking to target overweight/obesity and maintain an optimal body weight. These physical activity guidelines are similar to those recommended by the World Health Organization for general health[28]. The health effects of fitness are suggested to be mediated in part through the positive health benefits of engaging in regular physical activity [14]. Among the different types of exercise practiced in the community, walking is one of the most popular aerobic activities. Walking is an appropriate exercise for people of all ages. Studies have indicated that physical benefits of walking are related to consistent adherence and regular exercise[29]. Many previous studies have suggested that aerobics and brisk walking are the best methods for weight reduction[30,31,32]. Debate continues among health professionals about whether the treadmill walking or brisk walking is better exercise for reducing abdominal obesity and maximizing improvements in CVD risk factors. In this study our aim was to see the effect of different types of walking like brisk walking and treadmill walking on central obesity. Our results confirm that brisk walking is better than treadmill walking in reducing abdominal fat. Hong et al.[33] investigated the effect of 12-week walking exercise on abdominal fat in obese women. The walking exercise was performed at the exercise intensity as 50 to 60% of VO2max. They found that the exercise led to significant reductions in both subcutaneous and visceral adiposities in consistent with our study. A study by Keating et al[34] reported a significant reduction in visceral adipose tissue in overweight/obese adults received different intensity aerobic exercise without differences between the intensity. Their results also support our study. On the other hand Gutin et al[35] reported no clear effect of the intensity of physical training on the reduction of visceral adiposity whereas Irving et al[36] reported the importance of exercise intensity in obese adults with abdominal visceral fat as a primary outcome parameter. Studies in overweight and obese participants have consistently shown that HIIT (High intensity interval training) performed on treadmill or cycle ergometer (12–26 weeks) can reduce BMI, waist circumference, body weight and body fat percentage versus a no-exercise control [37].Their results are in consistence of our study. However, randomized controlled trials (RCT) suggest that brisk walking interventions (≥12 weeks) elicit only a small beneficial effect on bodyweight and adiposity outcomes in overweight and obeseadults[38,39,40]. Some studies are not in consistent with our result. For example, Maciejczyk et al. conducted an aerobics study involving male subjects and the results were negative[41]. A previous study concluded that participating in brisk walking and aerobics in combination with diet therapy 3 days/week, for 10 weeks, did not lead to a significant reduction in BMI or waist circumference[42].

Limitation of the study are relatively less number of participants, more parameters and investigations of obesity and central obesity should be included in the study for having more precise results.

Conclusion

We concluded that although both types of walking reduces overall obesity and central obesity effectively but 12 weeks of brisk walking is more effective way for reducing central obesity as compared to treadmill walking.

References

1. World Health Organization. Obesity and Overweight https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight (visited in january 2020)
2. World Health Organization. Obesity and Overweight. Global Strategy on Diet.

Physical Activity and Health. Fact Sheet; 2006, No 311.
3. Oh S, Tanaka K, Noh JW, So R, Tsujimoto T, Sasai H, et al. Abdominal obesity: causal factor or simply a symptom of obesity-related health risk. Diabetes MetabSyndrObes2014;7:289-96.
4. Haffner SM. Abdominal adiposity and cardiometabolic risk: do we have all the answers? Am J Med 2007;120(suppl):S10–6.
5. Despres JP, Lemieux I. Abdominal obesity and metabolic syndrome. Nature 2006; 444:881–7.
6. Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc2007;39:1423-34.
7. Ismail I, Keating SE, Baker MK, Johnson NA. A systematic review and meta-analysis of the effect of aerobic vs. resistance exercise training on visceral fat. Obes Rev 2012;13:68-91.
8. U.S. Department of Health and Human Services. Physical Activity Guidelines for Americans. 2008, ODPHP Publication No. U0036. Available from: www.health.gov/ paguidelines.
9. Vissers D, Hens W, Taeymans J, Baeyens JP, Poortmans J, Van Gaal L. The effect of exercise on visceral adipose tissue in overweight adults: a systematic review and meta-analysis. PLoS One 2013;8:e56415.
10. Centre for Health Protection, Exercise and Health - Brisk Walking recommendation for general public, Department of Health, Hongkong ,2018
11. Department of Health. Exercise Prescription Doctor's Handbook; 2012. Available online: http://exerciserx.cheu.gov.hk/files/DoctorsHanbook_fullversion.pdf (accessed on 14 October 2013).
12. United States: Department of Health. Physical Activity and Health: A Report of the Surgeon General; DIANE Publishing: Darby, PA, USA, 1996.
13. Physical Activity Guidelines Advisory Committee. Physical Activity Guidelines Advisory Committee Report, 2008. Washington, DC: U.S. Department of Health and Human Services,2008
14. Ortega FB, Lavie CJ, Blair SN. Obesity and cardiovascular disease. Circ Res. 2016;118:1752–70.
15. Lavie CJ, De Schutter A, Parto P, Jahangir E, Kokkinos P, Ortega FB, Arena R, Milani RV. Obesity and prevalence of cardiovascular diseases and prognosisthe obesity paradox updated. Prog Cardiovasc Dis. 2016;58:537–47.
16. Lee CD, Blair SN, Jackson AS. Cardiorespiratory fitness, body composition, and all-cause and cardiovascular disease mortality in men. Am J Clin Nutr. 1999;69:373–80.
17. Borodulin K, Laatikainen T, Lahti-Koski M, Lakka TA, Laukkanen R, Sarna S, Jousilahti P. Associations between estimated aerobic fitness and cardiovascular risk factors in adults with different levels of abdominal obesity. Eur J Cardiovasc PrevRehabil. 2005;12:126–31.
18. Lee S, Kuk JL, Katzmarzyk PT, Blair SN, Church TS, Ross R. Cardiorespiratory fitness attenuates metabolic risk independent of abdominal subcutaneous and visceral fat in men. Diabetes Care. 2005;28:895–901
19. World Health Organization. *Global health risks: mortality and burden of disease attributable to selected major risks*. Geneva: World Health Organization; 2009.
20. Roux L, Pratt M, Tengs TO, Yore MM, Yanagawa TL, Van Den Bos J, Rutt C, Brownson RC, Powell KE, Heath G, Kohl HW 3rd, Teutsch S, Cawley J, Lee IM, West L, Buchner DM. Cost effectiveness of community-based physical activity

interventions. *Am J Prev Med* 2008; Dec;35(6):578-88.

21. Lau DC, Douketis JD, Morrison KM, Hramiak IM, Sharma AM, Ur E. 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. CMAJ 2007; 176(suppl):S1–13.
22. Klein S, Burke LE, Bray GA, et al. Clinical implications of obesity with specific focus on cardiovascular disease: a statement for professionals from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism: endorsed by the American College of Cardiology Foundation. Circulation 2004;110:2952–67.
23. Jakicic JM, Clark K, Coleman E, et al. American College of Sports Medicine position stand: appropriate intervention strategies for weight loss and prevention of weight regain for adults. Med Sci Sports Exerc2001;33:2145–56.
24. Jia H, Lubetkin EI. The impact of obesity on health-related quality-of-life in the general adult US population. J Public Health (Oxford, England). 2005;27(2):156–64.
25. Flegal KM, Kit BK, Orpana H, Graubard BI. Association of all-cause mortality with overweight and obesity using standard body mass index categories: a systematic review and meta-analysis. JAMA. 2013;309(1):71–82.
26. Donnelly J, Blair S, Jakicic J, Manore M, Rankin J, Smith B. American College of Sports Medicine Position Stand. Appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults. Med Sci Sports Exerc. 2009;41(2):459.
27. Haskell W, Lee I, Pate R, Powell K, Blair S, Franklin B, et al. Physical activity and public health: updated recommendations for adults from the American College of Sports Medicine and the American Heart Association. Circulation. 2007;116:1081–93.
28. World Health Organization. Global recommendations on physical activity forhealth. Geneva: World Health Organization; 2010.
29. Donesky-Cuenco, D.; Janson, S.; Neuhaus, J.; Neilands, T.B.; Carrieri-Kohlman, V. Adherence to a home-walking prescription in patients with chronic obstructive pulmonary disease. Heart Lung 2007,36, 348–363. [CrossRef] [PubMed]
30. Esposito K, Pontillo A, Di Palo C, et al.: Effect of weight loss and lifestyle changes on vascular inflammatory markers in obese women: a randomized trial. JAMA, 2003, 289: 1799–1804. [Medline] [CrossRef]
31. Klem ML, Wing RR, McGuire MT, et al.: A descriptive study of individuals successful at long-term maintenance of substantial weight loss. Am J Clin Nutr, 1997, 66: 239–246. [Medline]
32. Ali ZM, El-Refay BH, Ali RR: Aerobic exercise training in modulation of aerobic physical fitness and balance of burned patients. J Phys Ther Sci, 2015, 27: 585–589. [Medline] [CrossRef]
33. Hong HR, Jeong JO, Kong JY, Lee SH, Yang SH, Ha CD,et al. Effect of walking exercise on abdominal fat, insulinresistance and serum cytokines in obese women. J Exerc Nutrition Biochem2014;18:277-85.
34. Keating SE, Hackett DA, Parker HM, O'Connor HT,Gerofi JA, Sainsbury A, et al. Effect of aerobic exercise training dose on liver fat and visceral adiposity. J Hepatol2015;63:174-82.
35. Gutin B, Barbeau P, Owens S, Lemmon CR, Bauman M, Allison J, et al. Effects of exercise intensity on cardiovascular fitness, total body composition, and visceral adiposity of obese adolescents. Am J Clin Nutr2002;75:818-26.
36. Irving BA, Davis CK, Brock DW, Weltman JY, Swift D,Barrett EJ, et al. Effect of exercise training intensity on abdominal

visceral fat and body composition. Med Sci Sports Exerc2008;40:1863-72.

37. Kessler HS, Sisson SB, Short KR. The potential for high-intensity interval training to reduce cardiometabolic disease risk. Sports Med. 2012;42(6):489–509.
38. Richardson CR, Newton TL, Abraham JJ, Sen A, Jimbo M, Swartz AM. A meta-analysis of pedometer-based walking interventions and weight loss. Annals Family Med. 2008;6(1):69–77.
39. Murphy MH, Nevill AM, Murtagh EM, Holder RL. The effect of walking on fitness, fatness and resting blood pressure: a meta-analysis of randomised, controlled trials. Prev Med. 2007;44(5):377–85.
40. Thorogood A, Mottillo S, Shimony A, Filion KB, Joseph L, Genest J, et al. Isolated aerobic exercise and weight loss: a systematic review and metaanalysis of randomized controlled trials. Am J Med. 2011;124(8):747–55.
41. Maciejczyk M, Więcek M, Szymura J, et al.: The influence of increased body fat or lean body mass on aerobic performance. PLoS ONE, 2014, 9: e95797 [Medline] [CrossRef]
42. Akdur H, Sozen AB, Yigit Z, et al.: The effect of walking and step aerobic exercise on physical fitness parameters in obese women. J Int faculty Med, 2007, 70: 64–69.