

**EFFECT OF 12 WEEKS OF HOME BASED EXERCISES ON BODY COMPOSITIONS IN OVERWEIGHT AND OBESE WOMEN****MANISHA A. RATHI\*<sup>1</sup>, Dr. ALI IRANI<sup>2</sup> AND Dr. V. A. KAKRANI<sup>3</sup>**<sup>1</sup>*Dr. D. Y. Patil College of Physiotherapy, Dr. D. Y. Patil Vidyapeeth, Pune*<sup>2</sup>*Department of Sports and Physiotherapy, Dr. Balabhai Nanavati Hospital, Vile Parle (W), Mumbai*<sup>3</sup>*Dr.D.Y.Patil Medical College, Hospital and Research Center, Dr. D. Y. Patil Vidyapeeth, Pune***ABSTRACT**

Background of the study:- Women were more vulnerable to obesity epidemic than men. Time and cost can be the barriers in reducing obesity. Exercises in home environment can help in reducing weight and body fat. Hence objective of this study was to find out the efficacy of home based exercises in women. Methodology:- In this experimental study design, 110 overweight and obese women were selected. Home based exercises including 30 min. walking plus 15 min. mat exercises were explained and 2 sessions were practiced and they were instructed to do the exercises for 5 days/week for 12 weeks at home. Body compositions like Weight, Body Mass Index (BMI) and Percentage of body fat were measured before and after the exercises. Statistical significance was considered at 95 % Confidence Interval. Result:- Mean weight was reduced significantly in women ( $2.20 \pm 1.38$  Kg). Pre weight was  $65.11 \pm 8.5$  Kg. whereas post weight was  $62.61 \pm 8.2$  Kg. Mean BMI was also reduced significantly as  $p < 0.01$ . Pre and post BMI in women was 26.54 and 25.65 kg/m<sup>2</sup>. Percentage of body fat also show significant reduction in 12 weeks. Conclusions: Women showed positive response to home based exercises on body composition. As it is cost effective and flexible in timings and venue, it can be easily practiced in community.

**KEY WORDS:** Obesity, Body Composition, BMI, Percentage of Body Fat , Women.**MANISHA A. RATHI**

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## INTRODUCTION

Obesity (more precisely, over fatness) is defined as an excess accumulation of body fat, is a heterogeneous disorder with a final common pathway in which energy intake chronically exceeds energy expenditure.<sup>1</sup> Obesity has reached at an alarming rate throughout the world and showed high prevalence among all the groups of adults especially in women in both developed and developing countries.<sup>2</sup> Often coexisting in developing countries with under-nutrition, obesity is affecting virtually all ages and socioeconomic groups.<sup>3</sup> According to WHO factsheet in 2015, worldwide more than 1.9 billion adults, 18 years and older, were overweight. Of these over 600 million were obese. Overall 39% of adults were overweight and 13 % were obese.<sup>4</sup> Obesity is a chronic, multifactorial disease with complex psychological, environmental (social and cultural), genetic, physiologic, metabolic and behavioral causes and consequence (American Obesity Association). Environmental and behavioral changes brought about by economic development, modernization and urbanization have been linked to the rise in global obesity. Obesity epidemic has important public health consequences because obesity is associated with numerous disease and disability and shorter life expectancy.<sup>5,6</sup> Women experience one or several life changing experiences that makes them vulnerable to weight gain. Rathi M. (2012) concluded that Pregnancy and post delivery period leads to significant amount of fat mass retention.<sup>7</sup> Changes in social roles such as entering or leaving marriage influence physical characteristics such as body weight. Women who were unmarried at the baseline and married at follow-up showed greater weight change than those who were married at both times.<sup>8</sup> Zargar AH et al (2004) stated that Obesity is a growing problem even in developing regions like India and is more common in females and in urban population.<sup>9</sup> Shah Ebrahim, et al (2010) studied that Migration into urban areas is associated with increases in obesity, which drive other risk factor changes.<sup>10</sup> Mrunalini K. and Vivek N. (2015) concluded that there is close relationship in between percentage of body fat and blood sugar level which increases with age.<sup>11</sup> Long-term weight loss strategies are of limited success, and the costs associated with obesity treatment are high.<sup>12, 13</sup> Home based exercises were found effective in various conditions and it will be cost effective if it works. Lison JF (2012) found that Simple home-based combined exercise and Mediterranean diet program may be effective among overweight and obese children and adolescents, because it improves body composition, is feasible and can be adopted on a large scale without substantial expenses.<sup>14</sup> Home-based exercise training significantly increases functional capacity in healthy, middle-aged adult. Such training provides an alternative to group-based exercise training.<sup>15</sup> Hence an objective of this study was to find out the effect of home based exercises on overweight and obese urban and rural females on weight, BMI, waist circumference and percentage of body fat.

## MATERIALS AND METHODS

In this pre-post experimental study design, 110 women were included. Ethical approval was obtained from the Institutional sub ethical committee. Women from the age of 20 years to 45 years, BMI more than 23.00 Kg/m<sup>2</sup> and those who were ready take part in the study for 12 weeks were included in the study whereas females having Blood pressure more than 140/90 mmHg, blood sugar more than 140 mg/dl, pregnant and post menopausal females were excluded from the study. Informed written consent was taken from all the participants. Demographic data, diet history, Socioeconomic status were assessed in the beginning of the study. Weight was measured using calibrated weighing scale with minimum cloths and height was measured using stadiometer. Body Mass Index was calculated by the formula in Kg. /m<sup>2</sup> Women were categorized according to South East Asian Classification of BMI i.e. BMI from 23.00 to 24.99 kg/m<sup>2</sup> were overweight whereas BMI from 25.00 Kg/m<sup>2</sup> and above were obese. Waist circumference was measured at the 1 inch above the level of umbilicus using cloth measuring tape. Skinfold thickness was assessed using skinfold caliper at 7 sites (Mid-axillary, sub-scapular, thigh, abdomen, chest, triceps and supra-inguinal region) and it was then converted into body density and percentage of body fat. Fat weight was also calculated using percentage of body fat and body weight.<sup>16</sup> All these measurements were recorded before and after the intervention. Counseling was done for all the women about the healthy diet and role of exercises in reducing weight. All participants were instructed to complete a moderate-intensity walking program (30 min/day) in their home environment. After walking, they were informed to do 2 sets of 10 exercises with 10 repetitions each. Intensity of exercises was assessed by Borg Scale with rate of perceived exertion level of 11- 13. A chart was given to all of them and asked them to tick whenever they go for walking and do exercises. Chart was checked every 4 weeks. They were asked to do the walking and exercises for 5 times per week for 12 weeks and then post parameters were recorded.

## RESULTS

Demographic details of the women included in the study were shown in table 1. Weight, Body Mass Index, Percentage of body fat, Fat weight and Waist circumference before and after the home based exercises were shown in the table 2. All data were expressed as the means  $\pm$  Standard Deviation. A 'paired t test' was used to compare the data from before and after the 12 weeks exercise programme P values less than 0.05 were considered to be statistically significant. In this study, out of total 110 women, 35 were overweight and 75 were obese. Weights, Body Mass Index, percentage of body fat and waist circumference were reduced significantly. Home Based exercises were found effective in reducing more than 2 kg. of body weight. This also showed significant reduction in the fat weight among women which was almost 1.8 kg. It has been observed that nearly 30% women reduced more than 3 kg. weight in 12 weeks of duration. Thirteen overweight women shifted to normal category whereas 22 obese women shifted to overweight category.

**Table 1**  
**Demographic data**

Particulars	
Marital Status	Married - 85.45% ( n=94)
	Single/Widow - 14.54 % (n=16)
Socioeconomic Status	Upper –31.81% ( n=35)
	Upper middle – 19.09% (n=21)
	Middle – 30.90% (n=34)
	Lower Middle – 11.81% (n=13)
No. of Children	None – 19.09 % (n=21)
	One – 21.81 % (n=24)
	Two- 50 % (n=55)
	Three or more than three - 9.09 % (n=10)
BMI Category	Overweight - 31.81 % (n=35)
	Obese - 68.18 % (n=75)
Mean Age	33.56 yrs.
Mean Height	156.46 cm.

**Table 2**  
**Pre and post comparison after Home Based Exercises in women**

Particulars	Pre	Post	Diff.	t- test and P value
Weight	65.11	62.91	2.20	t = 16.67
	(SD = 8.57)	(SD = 8.20)	(SD = 1.38)	p<0.000
BMI	26.54	25.65	0.89	t= 16.91
	(SD=2.72)	(SD=2.61)	(SD = 0.55)	p<0.000
Waist Circumference	89.96	88.54	1.43	t= 16.59
	(SD=7.73)	(SD=7.34)	(SD= 0.89)	p<0.000
Percentage of Body Fat	33.71	32.12	1.593	t= 15.693
	(SD = 4.86)	(SD = 4.65)	(SD=1.06)	p<0.000
Fat Mass Changes	22.25	20.47	1.78	t= 16.96
	(SD = 5.81)	(SD = 5.32)	(SD= 1.1)	p<0.000

## DISCUSSION

Present study examined the effect of home based exercises ( walking for 30 min and mat exercises for 15 min. ) on body compositions in women. Subject compliance is very important while performing home based exercise programme with self report as a part of treatment intervention. In order to increase the adherence to the exercise programme, chart was provided to them and asked them to mark on the chart whenever they perform exercises and follow-up was done after every 4 weeks. K. Shailaja et al (2011) concluded that the counseling provided to the patient helped in decreasing body weight, waist circumference and risk of weight related problems.<sup>17</sup> In the present study, counseling was done before starting the home based exercises about the healthy diet including quantity and timings of meals and low calorie food items and lifestyle modifications, physical activity and behavior changes. Motivation to lose weight was also rendered by providing information regarding the correlation of obesity/ excess fat with hypertension, diabetes mellitus, cancer, and early occurrence of degenerative diseases etc. Role of exercises in reducing weight was also explained to all the participants. This helped the women in reducing weight, waist circumference and percentage of body fat. Level of education was one of the major contributing factors in understanding the concept of weight loss, and in this study we had participants with more than higher secondary education. Ostovan et al ( 2013) concluded in their study that teaching how to modify lifestyle and to gain more self control with eating have the major role in reducing weight and BMI. They found almost 5% of weight loss from their initial weight

was observed during 3 months of period.<sup>18</sup> A study conducted by Zhang et al (2015) concluded that in low density populations, strengthening peer influence may be a useful strategy in controlling weight.<sup>19</sup> Present study did not restrict diet to reduce weight but counseling was given regarding diet. King et al (2009) observed in their study that daily physical exercises helps in appetite regulation mainly through two processes, an increase in the overall (orexigenic) drive to eat and a concomitant increase in the satiating efficiency of a fixed meal. They studied effects of 12 wk of mandatory exercise on appetite control on 58 overweight and obese men and women. An Electronic Appetite Rating System was used to measure subjective appetite sensations immediately before and after the fixed breakfast in the immediate postprandial period and across the whole day. The result of the study showed significant reduction in mean body weight (3.2 kg), fat mass (3.2 kg), and waist circumference (5.0 cm) after 12 wk. The analysis showed that a reduction in body weight and body composition was accompanied by an increase in fasting hunger and in average hunger across the day.<sup>20</sup> Percentage of body fat was significantly reduced after 12 weeks of Home Based Exercises. When women performed the exercises on regular basis, energy expenditure increased and it created negative energy balance. After 45 min. of exercises, body temperature increased and more energy demand arises. This creates mobilization of fat from its depot and then metabolized to meet the energy demand of exercises, ultimately total percentage of fat reduces. Aerobic exercises (home based exercises given in the study) gets energy when fat metabolizes. Rossi et al (2015) concluded in the study that combined training ( aerobic plus strength) and aerobic training decreased core fat and increased fat

free mass, so improving body composition.<sup>21</sup> Fat weight was significantly reduced in women. Hansen D. et al (2007) found that type of exercises (walking, cycling, swimming etc.) plays another important predictor of fat mass loss in intervention programme.<sup>22</sup> Suleen et al (2012) showed similar result where they found that fat weight was decreased by almost 1 kg. after doing aerobic exercises and 1.6 Kg. in combination exercises which was given for 12 weeks.<sup>23</sup> Park et al (2003) observed that combination exercises was more effective in decreasing body weight, Body Mass Index, percentage of body fat and fat weight than aerobic exercises alone.<sup>24</sup> Interestingly a similar study by Church et al (2010) served a significant decrease in body mass in the combination group compared to control and resistance group after 9 months of training.<sup>25</sup> Waist circumference was reduced in women (1.43 cm), this shows one cm circumference reduction leads to almost 1.5 kg. weight loss. Noboyuki Miyatake et al (2007) found that 3 kg. loss of weight corresponds to 3 cm loss in waist circumference.<sup>26</sup> In this study, researcher observed the similar proportionate findings after 12 weeks of intervention. As the weight and percentage of body fat reduced, circumference was also reduced. Waist circumference was reduced in our study was less than the study done by Robert Ross (2004) where exercise group showed nearly 6 cm. reduction in waist circumference. There were methodological variations where diet was restricted and daily exercises with the energy expended were 500Kcal/d monitored for 14 weeks.<sup>27</sup> In present study, women showed better results due to the effect of education. This weight reduction can be determined by at least three factors, 1) greater access to the obesity

and health related information and improved ability to handle such information, 2) clearer perception of the risk associated with lifestyle and diet, 3) improved self control and consistency of preferences over time. It can also be achieved due to the education level of the peers, as they can also help in motivating the subjects and thereby reducing weight.<sup>28</sup> In this study, women showed weight loss and they had higher socioeconomic status or high income of which make them to concentrate more on their health and diet. D. W. Johnston et al (2014) conducted a study on British people and suggested that high income individuals are more likely to recognize their unhealthy weight status and conditional on this correct weight perception, more likely to attempt weight loss.<sup>29</sup> Indian women with high income understood it in better way after counseling and hence they showed significant weight changes. Present study found the effect of home based exercises on women after 12 weeks. Diet was not restricted during the study period, only counseling was given to all participants hence this can be one of the limitation of the study. Further research can be conducted on the effect of home based exercises for long duration and carry over effect of this 12 weeks exercise programme among women. This study concludes that Home Based Exercises were effective in reducing BMI, Waist circumference and percentage of Body Fat in overweight and obese women. It can be practiced as one of the community based protocol for weight control and reduction as it is cost effective and flexible in time and venue.

## CONFLICT OF INTEREST

Conflicts of interest are declared none.

## REFERENCES

1. William D. Mc'Ardle, Frank I. Katch, Victor Katch. Exercise Physiology: Energy, Nutrition, and Human Performance. Pete Darsy, Editor. 5<sup>th</sup> edition. Lippincott William and Wilkins Publication; 2001. p. 823.
2. World Health Organization, Overweight and obesity fact sheet, Department of Sustainable Development and healthy environment. Sept. 2011. Available from [http://www.searo.who.int/entity/noncommunicable\\_diseases/media/non\\_communicable\\_diseases\\_obesity\\_fs.pdf](http://www.searo.who.int/entity/noncommunicable_diseases/media/non_communicable_diseases_obesity_fs.pdf)
3. Puska P, Nishida C, & Porter D, World Health Organization. Global Strategy on Diet, physical Activity and health, Obesity and Overweight. 2003. Available from [http://www.who.int/dietphysicalactivity/media/en/gfsfs\\_obesity.pdf](http://www.who.int/dietphysicalactivity/media/en/gfsfs_obesity.pdf)
4. World Health Organization. Overweight and Obesity, Factsheet N 311; Updated in January 2015. Available from <http://www.who.int/mediacentre/factsheets/fs311/en/>
5. Visscher TL, Seidell JC. The public health impact of obesity. Annu Rev Public Health. 2001;22:355-75.
6. Olshansky SJ, Passaro DJ, Hershow RC, Layden J, Carnes BA, Brody J, et al. A Potential Decline in life Expectancy in the United States in the 21<sup>st</sup> Century. N Engl J Med. 2005 Mar 17; 352(11):1138-1145.
7. Rathi M, Palekar T. A Study of Weight and Girth Variations During Pregnancy and Postpartum in Underweight, Normal and Overweight Women. Indian Journal of Physiotherapy & Occupational Therapy. 2012 Oct 1;6(4).
8. Sobal J, Rauschenbach B, Frongillo EA. Marital status changes and body weight changes: a US longitudinal analysis. Soc Sci Med. 2003 Apr 30;56(7):1543-55.
9. Zargar AH, Masoodi SR, Laway BA, Khan AK, Wani AI, Bashir MI, Akhtar S. Prevalence of obesity in adults--an epidemiological study from Kashmir Valley of Indian Subcontinent. J Assoc Physicians India. 2000 Dec;48(12):1170-4.
10. Ebrahim S, Kinra S, Bowen L, Andersen E, Ben-Shlomo Y, Lyngdoh T, et al. The Effect of Rural-to-Urban Migration on Obesity and Diabetes in India: A Cross-Sectional Study. 2010 PLoS Med 7(4):e1000268. doi:10.1371/journal.pmed.1000268.
11. Mrunalini Kanvinde Dr. Vivek Nalgirkar. Percentage Body Fat in Diabetic Mellitus. Int J Pharm Bio Sci. 2015 Oct; 6(4): 777 – 783.
12. World Health Organization. Obesity: Preventing and Managing the global epidemic, Report of a

- World Health Organization consultation on Obesity, Technical Report Series, No. 894, Geneva, Switzerland, 2000, p-245-253. Available from [http://www.who.int/nutrition/publications/obesity/WHO\\_TRS\\_894/en/](http://www.who.int/nutrition/publications/obesity/WHO_TRS_894/en/)
13. Access Economics. The growing costs of obesity in 2008: three years on. Report by Access Economics Pty Ltd to Diabetes Australia. Canberra: Diabetes Australia, August 2008. Available from <https://static.diabetesaustralia.com.au/s/fileassets/diabetes-australia/7b855650-e129-4499-a371-c7932f8cc38d.pdf>
  14. Lisón JF, Real-Montes JM, Torró I, Arguisuelas MD, Alvarez-Pitti J, Martíne z-Gramage J, Aguilar F, Lurbe E. Exercise intervention in childhood obesity: a randomized controlled trial comparing hospital-versus home-based groups. *Acad Pediatr.* 2012 Jul-Aug;12(4):319-25.
  15. Juneau M, Rogers F, De Santos V, Yee M, Evans A, Bohn A, Haskell WL, Taylor CB, DeBusk RF. Effectiveness of self-monitored, home-based, moderate-intensity exercise training in middle-aged men and women. *Am J Cardiol.* 1987 Jul 1;60(1):66-70.
  16. Gregory B. Dwyer, Shala E. Devis. ACSM's Health Related Physical Fitness Assessment Manual. Lippincott Williams and Wilkins Publication. 6<sup>th</sup> edition.2005; p 64-65.
  17. K. Shailaja, M. Mohammed Moideen, M. Ashok Kumar, and C. Ramasamy. Effectiveness of Patient Counseling in Urban and Rural Overweight and Obese Patients. *Int J Pharm Bio Sci.* 2011 July;2(3):173-185.
  18. Ostovan MA, Zibaeenezhad MJ, Keshmiri H, Shekarforoush S. The Impact of Education on Weight Loss in Overweight and Obese Adults. *Int Cardiovasc Res J.* 2013 Sept;7(3):79-82.
  19. Zhang J, Tong L, Lamberson PJ, Durazo-Arvizu RA, Luke A, Shoham DA. Leveraging social influence to address overweight and obesity using agent-based models: the role of adolescent social networks. *Soc Sci Med.* 2015 Jan;125: 203-13.
  20. Neil A King, Phillipa P Caudwell, Mark Hopkins, James R Stubbs, Erik Naslund, and John E Blundell. Dual-process action of exercise on appetite control: increase in orexigenic drive but improvement in meal-induced satiety. *Am J Clin Nutr.* Oct.2009; 90(4): 921-927.
  21. Rossi.FE, Fortaleza AC, Neves LM, Bounani C, Picolo MR, Diniz TA, et al. Combined Training (aerobic plus strength) potentiates a reduction in body fat but demonstrates no difference on the lipid profile in post menopausal women when compared with aerobic training with a similar training load. *J Strength Cond Res.* 2016 Jan; 30(1):226-34.
  22. Hansen D. Dendale P. Berger J. van loon LJ, Meeusen R. The effect of exercise training on fat –mass loss in obese patients during energy intake restriction. *Sports Med.* 2007;37(1):31-46.
  23. Ho SS, Dhaliwal SS, Hills A, Pal S. The effect of 12 weeks of aerobic, resistance or combination exercise training on cardiovascular risk factors in the overweight and obese in a randomized trial. *BMC Public Health.* 2012 Aug.28; 12:704.
  24. Park SK, Park JH, Kwon YC, Kim HS, Yoon MS, Park HT. The effect of Combined Aerobic and Resistance Exercise Training on Abdominal Fat in Obese Middle – Aged Women. *Journal of Physiological Anthropology and Applied Human Science.* 05/2003; 22(3):129-35.
  25. Church TS, Blair SN, Cocreham S, Johannsen N, Johnson W, Kramer K, et al. Effects of aerobic and resistance training on hemoglobin A1c levels in patients with type 2 diabetes: a randomized controlled trial. *JAMA.* 2010 Nov. 24; 304(20): 2253–2262.
  26. Miyatake N, Matsumoto S, Miyachi M, Fujii M, Numata T. Relationship between changes in body weight and waist circumference in Japanese. *Environmental Health and Preventive Medicine.* 09/2007;12(5): 220-223.
  27. Ross R, Janssen I, Dawson J, Kungl AM, Kuk JL, Wong SL, et al. Exercise-induced reduction in Obesity and Insulin resistance in Women: a randomized Controlled trial. *Obes Res.* 2004 May; 12(5): 789-98.
  28. Marion Devaux, Franco Sassi, Jody Chruch, Michele Cecchini, Francesca Borgonovi. Exploring the relationship between education and obesity. *OCED Journal: conomic Studies* 2011;1: 121-159.
  29. Johnston DW, Lordan G. Weight perceptions, weight control and income: an analysis using British data. *Economics and Human Biology.* 2014;12: 132-39.