

Comparing the level of physical activity among Obese and Normal BMI females in Chennai using International Physical Activity Questionnaire (IPAQ) - A Case Control Study

Kiruthika S¹, Sathya P²

¹ Final year Postgraduate, ² Director & Professor, Institute of Physiology and Experimental Medicine, Madras Medical College, Chennai, Tamil Nadu.

Abstract:

Background: Recently, it has been shown that sedentary behavior poses a significant risk for cardiometabolic disorders. Numerous studies have demonstrated the link between sedentarism and higher body weight, and consistent exercise can not only improve muscular strength, and aerobic capacity, muscle mass, flexibility, decrease in body fat, and but also reductions in blood pressure, anxiety, and stress levels. The purpose of the study was to understand the level of physical activity engaged by obese and normal BMI females on a daily basis since women have better tendency to get fat deposition than males and also women have lack of knowledge regarding physical activity. **Aim:** The aim of this study is to assess the physical activity among obese and normal BMI females by using International Physical Activity Questionnaire (IPAQ). **Materials and methods:** The study was started after obtaining approval from Institutional Scientific and Ethics committee. The study was conducted in OPD at Madras Medical College. Females between 18-50 years were included in the study. The sample included 25 obese females with BMI ≥ 30 as cases and 25 non-obese females with BMI between 18.5 to 24.9 as controls based on the BMI classification of WHO. Both the groups were given Long last 7 days self-administered IPAQ which contains a total of 27 questions enquiring about time spent in physical activity in the last 7 days. **Results:** To compare the mean of two groups unpaired t-test was used. The mean age, height, weight, and BMI of two groups were compared and the mean age, weight and BMI were significantly higher among cases and the mean height was significantly higher among the controls. The association between physical activity and obesity in this study was found by using Fisher exact chi square test. It showed a significant p value of 0.0001, as the number of females involved in health enhancing physical activity i.e., at least 1.5- 2 hours of being active throughout the day, was less among obese females. **Conclusion:** This study seeks to highlight the lack of physical activity among the majority of the female population in the reproductive age range by classifying the amount of physical activity these women engage in a regular basis.

Keywords: BMI, females, physical activity

Corresponding Author:

Dr. P. Sathya, Director & Professor, Institute of Physiology and Experimental Medicine, Madras Medical College, Chennai, Tamil Nadu

Contact No: 9841814090, E-mail : sayapalaniswamy@gmail.com

Introduction:

Physical activity is a part of healthy life style. It increases energy expenditure and helps in regulating body weight.¹ It improves physical and

mental health. Engaging in physical activity may increase the brain's synthesis of endorphins, which are neurotransmitters that gives a sense of well-being. The definition of "physical activity,"

which is the most inclusive of the three terms, is "any bodily movement produced by skeletal muscles that results in energy expenditure."⁷

An inadequate level of moderate to vigorous physical activity (MVPA), or failing to meet specified physical activity guidelines, was referred to as physical inactivity. Any behavior that involves little energy expenditure or energy expenditure of less than 1.5 metabolic equivalents (METs) while sitting or lying down is referred to as sedentary behavior.¹² Irrespective of the nation's income level, obesity is a chronic illness that affects people of all ages and socioeconomic backgrounds.

Of non-pregnant women aged 20 to 39, 29% are obese and 26% are overweight. Women's health is adversely affected by obesity in numerous ways. Women who are overweight or obese have a higher relative risk of developing diabetes and coronary heart disease.⁵ Obese women are more likely to have risk of developing osteoarthritis in the knees and low back pain. Obesity and overweight have been linked to a higher risk of preterm deliveries, cesarean sections, poor birth outcomes, and infant mortality in women of childbearing age.⁸

The epidemiology of obesity in females needs to be monitored in order to gain a better understanding of the pathophysiology and risk factors associated with the condition, as the rate of increase in obesity continues to rise globally. This in turn could be used to create treatment and prevention plans tailored to each gender.¹⁰

Materials and methods:

The study was started after obtaining approval from Institutional Scientific and Ethics committee. The study was conducted in OPD at Madras Medical College. Females between 18-50 years were included in the study. The sample included 25 obese females with BMI ≥ 30 as cases and 25 non-obese females with BMI between 18.5 to

24.9 as controls based on the BMI classification of WHO. Detailed past medical and surgical history were taken and both groups were given the Long last 7 days self-administered IPAQ which contains a total of 27 questions enquiring about time spent in physical activity in the last 7 days. Using SPSS software the obtained data was analyzed.

Inclusion criteria:

1. Females
2. Age 18-50 years
3. BMI between 18.5 to 24.9 and BMI ≥ 30

Exclusion criteria:

1. Age < 18 & > 50 years.
2. Males
3. BMI less than 18.5 and BMI between 25-29.9
4. Pregnant and lactating females
5. Females with H/O Cardiovascular disorders, Diabetes, Thyroid disorder, Psychiatric illness and Autonomic neuropathy.

The participants were explained about the aim of the study and informed consent was obtained before the start of the study. The questionnaire was clearly explained in simple, comprehensible words to give a better knowledge to those who had difficulty in understanding the questions. Based on the information obtained from the questionnaire, categorical score was given with category I being inactive, category II minimally active and category III as Health Enhancing Physical Activity (HEPA). The gathered data was entered and tabulated in Microsoft Excel and analysis done with SPSS software.

Results:

The statistical test used in this study to compare the mean of two groups was unpaired t-test. The mean age, height, weight, and BMI of two groups were compared as shown in table 1. The mean age, weight and BMI were significantly higher among cases and the mean height was

significantly higher among the controls. To find the association between physical activity and obesity in this study Fisher exact chi square test was used, as shown in table 2. It showed a significant p value of 0.0001, as the number of

females involved in health enhancing physical activity i.e., at least 1.5- 2 hours of being active throughout the day, was less among obese females.

Table 1: Mean of two groups - Cases and Controls

Variables	Obese (n=25)	Non – Obese (n=25)	p-value
Age (years)	36.04 ± 7.37	31 ± 8.5	0.0298
Height (cm)	154.72 ± 3.0	157.24 ± 2.8	0.0035
Weight (Kg)	75.48 ± 3.40	54.08 ± 4.06	0.0001
BMI	31.60 ± 1.36	21.86 ± 1.61	0.0001

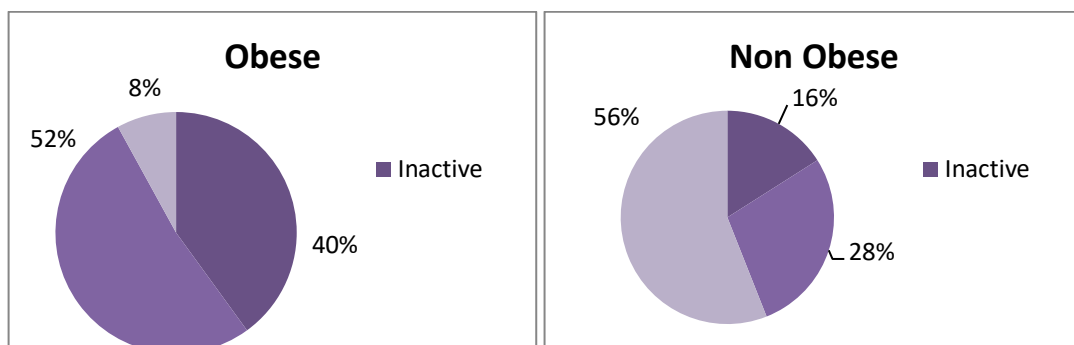
P= <0.05 (significant)

Table 2: Association between physical activity and obesity- Fischer Exact Chi square test

Variables	Inactive	Minimally active	Health Enhancing Physical Activity	p-value
Obese	10	13	2	0.0001
Non obese	4	7	14	

P= <0.05 (significant)

The following pie chart depicts the percentage of inactivity, minimal activity and Health enhancing physical activity engaged by obese and normal weight females.



Discussion:

The incidence of obesity-related cardiovascular disease (CVD) rises in conjunction with the global obesity prevalence. The year 2015 saw CVD, which is associated with a high BMI, emerge as the primary cause of mortality and disability-adjusted life years. For women in particular, the link between obesity and CVD has significant consequences. Women's deaths from CVD are the main cause of death in the major developed nations as well as the majority of emerging nations. The phenomena of women being shielded from hypertension until a later age is associated with the vasodilatory benefits of estrogens. Because the age at which hypertension begins and BMI have an inverse relationship, obesity counteracts the benefits of estrogen and breaks its shielding effect on Hypertension.¹⁰ Enlightening women about the health advantages of physical activity is one of the easiest and most efficient strategies for combating these negative impacts of obesity.

It takes a rigorous method to measure every kind of physical activity and figure out the energy cost related to each particular type and level of physical activity in order to examine the physical activity. The purpose of the International Physical Activity Questionnaire (IPAQ) is to quantify people's physical activity levels and associated metabolic equivalents (METs).¹⁷ Numerous techniques have been

devised to ascertain an individual's degree of physical activity. There is, however, little data to determine if a person is physically active or not. Accurately estimating physical activity is a challenging task due to its complexity.¹⁸

The International Physical Activity Questionnaire, the Global Physical Activity Questionnaire (GPAQ), and the physical activity diary are the available methods. Physical activity is accurately tracked by IPAQ (18). The International Physical Activity Questionnaire (IPAQ), which was used in this study, appears to be the most reliable method among many attempts to determine the indices of physical activity, useful in group comparisons as well as in individual counseling. It is the only reliable method in large-scale surveys in developed or developing countries.²⁰

The American Physical Activity Guidelines stipulate that a minimum of 150 minutes a week of moderate physical activity, sustained in 10-minute or longer bursts, must be accrued each week. Thus, it has been suggested that engaging in this kind of prolonged moderate-to-intense physical activity (MVPA) is a healthy habit that has a positive impact on many health outcomes.¹³ This study aims at proving the fact that there is lack of physical activity and also there is very little awareness about the essential benefits of physical activity especially among women.

IPAQ-INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home.

Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

Yes

No →

Skip to PART 2:TRANSPORTATION

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ **days per week**

No vigorous job-related physical activity



Skip to question4

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

_____ **hours per day**

_____ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

_____ **days per week**

No moderate job-related physical activity



Skip to question6

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

_____ **hours per day**

_____ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

_____ **days per week**

No job-related walking



Skip to PART 2: TRANSPORTATION

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **hours per day**

_____ **minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

_____ **days per week**

No traveling in a motor vehicle



Skip to question10

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

_____ **hours per day**

_____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

No bicycling from place to place



Skip to question12

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **hours per day**

_____ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

No walking from place to place



***Skip to PART 3: HOUSEWORK,
HOUSE MAINTENANCE, AND
CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ **hours per day**

_____ **minutes per day**



PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

_____ **days per week**

No vigorous activity in garden or yard



Skip to question16

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

_____ **hours perday**

_____ **minutes perday**

Again, think about only those physical activities that you did for at least 10 minutes at a time.

16. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

_____ **days per week**

No moderate activity in garden or yard



Skip to question18

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

_____ **hours per day**

_____ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

_____ **days per week**

No moderate activity inside home



Skip to PART 4: RECREATION,

***SPORT AND LEISURE-TIME
PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

_____ **hours per day**

_____ **minutes per day**



PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?
_____ **days per week**

No walking in leisure time



Skip to question22

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ **hours per day**

_____ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

_____ **days per week**

No vigorous activity in leisure time



Skip to question24

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

_____ **hours per day**

_____ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

_____ **days per week**

No moderate activity in leisure time



Skip to PART 5: TIMESPENT

SITTING

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?

_____ **hours per day**

_____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading



or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **week day**?

_____ **hours per day**
_____ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

_____ **hours per day**
_____ **minutes per day**

Conclusion:

This study was focused on level of physical activity among females, as females were expected to have an almost two-fold greater obesity rate than males. This gender discrepancy could be attributed to the sort of physical activity engaged in, with males engaging in strenuous physical exercise more frequently than females. The study shows positive association between physical inactivity and obesity among females which may lead to various cardiovascular, metabolic and reproductive abnormalities. The risk of these comorbidity can be decreased by encouraging physical exercise and educating them about the potential benefits that can be obtained from it. Hence physical activity should be regarded as a crucial preventive measure that can be taken against these many abnormalities.

Limitations:

The study's minuscule sample size was one of its main drawbacks. The samples in this study were divided into cases and controls based on BMI. The BMI is an overly simplistic metric to detect obesity because it solely takes into account height and weight. It is unable to differentiate between excess fat, muscle, or bone mass since it does not account for the weight of the muscular mass. There is no clue

regarding the distribution of fat using BMI. A bigger sample size and the use of the waist-hip ratio in addition to the BMI to obtain precise information regarding the existence of centripetal fat would have improved this study.

Acknowledgements: Nil

Conflict of interest: Nil

References:

1. Silveira EA, Mendonça CR, Delpino FM, Souza GV, de Souza Rosa LP, de Oliveira C, Noll M. Sedentary behavior, physical inactivity, abdominal obesity and obesity in adults and older adults: A systematic review and meta-analysis. *Clinical nutrition ESPEN*. 2022 Aug 1;50:63-73.
2. Belza B, Warms C. Physical activity and exercise in women's health. *Nursing Clinics*. 2004 Mar 1;39(1):181-93.
3. Zaffalon Júnior JR, Viana AO, de Melo GE, De Angelis K. The impact of sedentarism on heart rate variability (HRV) at rest and in response to mental stress in young women. *Physiological Reports*. 2018 Sep;6(18):e13873.
4. Csige I, Ujvárosy D, Szabó Z, Lőrincz I, Paragh G, Harangi M, Somodi S. The impact of obesity on the cardiovascular

- system. *Journal of diabetes research*. 2018 Nov 4;2018.
5. Csige I, Ujvárosy D, Szabó Z, Lőrincz I, Paragh G, Harangi M, Somodi S. The impact of obesity on the cardiovascular system. *Journal of diabetes research*. 2018 Nov 4;2018.
 6. Kelly T, Yang W, Chen CS, Reynolds K, He J. Global burden of obesity in 2005 and projections to 2030. *International journal of obesity*. 2008 Sep;32(9):1431-7.
 7. Kulie T, Slattengren A, Redmer J, Counts H, Eglash A, Schrager S. Obesity and women's health: an evidence-based review. *The Journal of the American Board of Family Medicine*. 2011 Jan 1;24(1):75-85.
 8. Lin X, Li H. Obesity: epidemiology, pathophysiology, and therapeutics. *Frontiers in endocrinology*. 2021 Sep 6;12:706978.
 9. Hwalla N, Jaafar Z. Dietary management of obesity: a review of the evidence. *Diagnostics*. 2020 Dec 25;11(1):24.
 10. Manrique-Acevedo C, Chinnakotla B, Padilla J, Martinez-Lemus LA, Gozal D. Obesity and cardiovascular disease in women. *International journal of obesity*. 2020 Jun;44(6):1210-26.
 11. Vadera BN, Yadav SB, Yadav BS, Parmar DV, Unadkat SV. Study on obesity and Influence of dietary factors on the weight status of an adult population in Jamnagar city of Gujarat: A cross-sectional analytical study. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*. 2010 Oct;35(4):482.
 12. Ghosh A, Bose K, Das Chaudhuri AB. Association of food patterns, central obesity measures and metabolic risk factors for coronary heart disease (CHD) in middle aged Bengalee Hindu men, Calcutta, India. *Asia Pacific journal of clinical nutrition*. 2003 Jun 1;12(2).
 13. Craft LL, Zderic TW, Gapstur SM, VanIterson EH, Thomas DM, Siddique J, Hamilton MT. Evidence that women meeting physical activity guidelines do not sit less: an observational inclinometry study. *International Journal of Behavioral Nutrition and Physical Activity*. 2012 Dec;9(1):1-9.
 14. Nawrocka A, Młynarski W, Cholewa J. Adherence to physical activity guidelines and functional fitness of elderly women, using objective measurement. *Annals of Agricultural and Environmental Medicine*. 2017;24(4).
 15. Pelclová J, Gába A, Tlučáková L, Pošpiech D. Association between physical activity (PA) guidelines and body composition variables in middle-aged and older women. *Archives of Gerontology and Geriatrics*. 2012 Sep 1;55(2):e14-20.
 16. Vallance JK, Murray TC, Johnson ST, Elavsky S. Quality of life and psychosocial health in postmenopausal women achieving public health guidelines for physical activity. *Menopause*. 2010 Jan 1;17(1):64-71.
 17. Kim S, Moritz J, Lee E, Kostareva O, Min R, Vrobel ZS, Zheng S. *Research Open. Endocrinology*;1(3).
 18. Ahmad MH, Salleh R, Mohamad Nor NS, Baharuddin A, RodzlanHasani WS, Omar A, Jamil AT, Appukutty M, Wan Muda WA, Aris T. Comparison between self-reported physical activity (IPAQ-SF) and pedometer among overweight and obese women in the MyBFF@ home study. *BMC women's health*. 2018 Jul;18(1):85-90.
 19. Pastuszek A, Lisowski K, Lewandowska J, Buśko K. Level of physical activity of physical education students according to criteria of the IPAQ questionnaire and the recommendation of WHO

- experts. *Biomedical Human Kinetics*. 2014 Jan 1;6(1).
20. Biernat E, Stupnicki R, Lebiedziński B, Janczewska L. Assessment of physical activity by applying IPAQ questionnaire. *Physical Education and Sport*. 2008;52(2):83-9.
21. Curry WB, Thompson JL. Comparability of accelerometer-and IPAQ-derived physical activity and sedentary time in South Asian women: A cross-sectional study. *European journal of sport science*. 2015 Oct 3;15(7):655-62.
22. Nicaise V, Crespo NC, Marshall S. Agreement between the IPAQ and accelerometer for detecting intervention-related changes in physical activity in a sample of Latina women. *Journal of Physical Activity and Health*. 2014 May 1;11(4):846-52.
23. Marshall ES, Bland H, Melton B. Perceived barriers to physical activity among pregnant women living in a rural community. *Public Health Nursing*. 2013 Jul;30(4):361-9.
24. Jefferis BJ, Sartini C, Lee IM, Choi M, Amuzu A, Gutierrez C, Casas JP, Ash S, Lennnon LT, Wannamethee SG, Whincup PH. Adherence to physical activity guidelines in older adults, using objectively measured physical activity in a population-based study. *BMC public health*. 2014 Dec;14(1):1-9.
25. Eyler AA, Brownson RC, King AC, Brown D, Donatelle RJ, Heath G. Physical activity and women in the United States: An overview of health benefits, prevalence, and intervention opportunities. *Women & Health*. 1998 Jan 23;26(3):27-49.
26. Reid C, Dyck L, McKay H, Frisby W. Health benefits of physical activity for girls and women. Canada; 2000.
27. Klusmann V, Evers A, Schwarzer R, Heuser I. Views on aging and emotional benefits of physical activity: Effects of an exercise intervention in older women. *Psychology of sport and exercise*. 2012 Mar 1;13(2):236-42.