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Comparison of Aerobic Capacity among Overweight and Non-Overweight Postpartum Women's

[1]Rahul A. Maid, [2]Vijay R. Bhartiya, [3]Pranjali Koshidgewar [4]Devendra Paliwal, [5]Umesh Deshpande
[1]Assistant Professor, [2]Associate Professor, [3]Intern, [4,5]Orthopedic Surgeon
[1,2,3]SGPN's NPCRC, Nanded, Maharashtra, India.
[4,5]Yashosai Hospital, Nanded, Maharashtra, India.

Abstract:- Post-delivery increased weight can cause intergenerational harm, negatively affecting a mother's cardiovascular and cardiopulmonary health. Cardiopulmonary exercise testing defines maximum aerobic capacity through measurement of VO_2max.VO_2max values have important role in informing patients' selection for advance obesity intervention. Aim - to know difference between aerobic capacity in overweight and non-overweight women. Method- 40 patient of age 18-30y; 20 overweight women with BMI >25 and women with BMI <25. The patients were asked to stepping bench for total duration 3 min. Result- This showed extremely significant improvement in VO_2Max and BORG Scale. Conclusion – This study suggest that overweight postpartum women had significantly reduced aerobic capacity when compared with non-overweight postpartum women.

Keywords:- *Body Mass Index, Aerobic Capacity, Exertional Dyspnea, VO_2Max, Postpartum Women.*

I. INTRODUCTION

Pregnancy has been identified as a length of threat for immoderate weight gain main to lengthy-time period weight retention and maternal weight problems. numerous research has suggested will increase in maternal frame weight ranging from 1.5 to 3kg above pre-being pregnant weight while postpartum weight is measured as much as 18 months postpartum, and from 0.5 to 6.2 kg while measured 2.5y–15y postpartum. [5]. The prevalence of obesity among postpartum women was over 40%. During childhood and adolescence, remarkable physiological, anatomical, and psychological transformations that affect physical fitness are caused by growth, maturation, and development. Physical fitness is a key idea in (clinical) exercise physiology and can be thought of as an integrated measure of most, if not all, of the body functions involved in daily physical activity and exercise[6]. Aerobic fitness, body composition, muscular strength, power, speed, balance, flexibility, and hand-eye coordination are examples of these body functions. [7].

One of the most crucial aspects of physical fitness is aerobic fitness. Adults with cardiovascular and pulmonary diseases, as well as healthy adults, have been shown to have lower morbidity and mortality rates when their aerobic fitness is higher[12,13]. Aerobic fitness has also been found to be a significant health indicator in adolescents. For instance, total adiposity and cardiovascular risk factors have been found to be inversely correlated with aerobic fitness [15].

The objective of cardiopulmonary exercise testing (CPET) is to evaluate a patient's functional capacity as well as the coordination of the cardiovascular and respiratory systems' physiological performance. One of the most common signs for which a cardiopulmonary exercise test is requested is unexplained dyspnoea on exertion (DOE) [8]. Exertional dyspnea can be caused by a variety of illness-related abnormalities, deconditioning alone or obesity alone, or both [9, 11]. In patients with dyspnea on exertion, physiological responses to exercise may be completely normal, or in many severe cases, patients may also be obese, greatly complicating the assessment of exercise limitations and the potential mechanisms of dyspnea on exertion. In order to investigate and uncover the mechanisms underlying dyspnea on exertion in otherwise healthy obese adults and clinical patients with both disease and obesity, this article will cover CPET[17].

In clinical practice, the complementary test known as CPET is becoming an increasingly important tool for examining cardiovascular diseases. Assessment of cardiorespiratory fitness, assistance with the investigation and follow-up of patients with myocardial ischemia, objective prescription of raining zones (in healthy individuals and patients with cardiac diseases), and differential diagnosis of dyspnea are just a few of the well-established uses for CPET. The groundworks of the CPET depend on a ventilatory examination of the breathed out gases, determined to evaluate the utilization of oxygen (VO2), the development of carbon dioxide (VCO2), and minute ventilation very still and during activity and recuperation[22]. The identification of functional capacity and the pathophysiologic responses during the rest-to-exercise transition are valuable information provided.

A precise evaluation of aerobic power and cardiometabolic variables at submaximal and maximal effort levels (for example: ventilatory edge), and Assessment of ventilatory effectiveness. Despite the fact that its initial purpose was to more precisely identify functional capacity, particularly in heart failure and the differential diagnosis of dyspnea[22], It is well known that living an active lifestyle is beneficial. A large number of these advantages are likewise connected with more significant levels of cardiorespiratory wellness (VO2max) which might apply defensive impacts that are free of conventional gamble factors. Additionally, even a modest increase in fitness can have significant health benefits for those who are not physically fit.

During a progressive cardiopulmonary exercise test up to maximal exertion, the measurement of maximal VO2 (VO2max) or peak VO2 (VO2peak) is widely regarded as the gold standard for evaluating aerobic fitness[18,19]. Important information that can be used for (differential) diagnostic, prognostic, and evaluative purposes in medicine is provided by the noninvasive and dynamic nature of the measurements that are carried out during cardiopulmonary exercise testing [20]. Adults with chronic conditions, in contrast to healthy adults, frequently limit their participation in sport and physical activity programs due to perceived or actual limitations imposed by their condition. [20].

Although physical activity is an important part of treating and preventing obesity [21], exertional dyspnea prevents many obese people from exercising regularly [22]. Even in the absence of comorbidities, exertional dyspnoea may be caused by a number of obesity-related limitations at rest and during exercise. These limitations are discussed in the following sections. The CPET method is a good way to examine potential causes of dyspnea on exertion in otherwise healthy adults by assessing multiple systems during exercise stress [17]. The significance of aerobic capacity in daily life to design the treatment convention in overweight post pregnancy ladies. to avoid the negative effects of postpartum weight gain. To figure out the distinction in high-impact limit among overweight and ordinary weight ladies. to determine the aerobic capacity of postpartum overweight women.

II. AIM AND OBJECTIVE

- *Aim*- To know exercise capacity in overweight postpartum women.

- *Objective*- Evaluate aerobic capacity in overweight postpartum women and comparing it with that of normal weight postpartum women.

- *Hypothesis*

- *Null Hypothesis*- No any difference in aerobic capacity in overweight and normal weight postpartum women.
- *Alternate Hypothesis*- Difference of aerobic capacity in overweight and normal weight postpartum women.

III. METHODOLOGY

Study design: Randomized Control Trial **Study type:** Cross sectional **Study duration:** 6 months. **Sample size:** 60 patients
Sampling method: Random sampling **Place of study:** NPCRC OPD **Study population:** Postpartum women with BMI >25 and BMI <25.

IV. CRITERIA FOR STUDY

Inclusion Criteria- Patients with overweight., Postpartum women., Patients with BMI >25 and BMI <25, Patients who are willing to participate. And Age –18-30year

Exclusion Criteria- Patients who are unwilling to participate.**,** Age <18 and >30**,** Patients with no other cardiopulmonary disorder. And Patient with no other postpartum consequences

V. PROCEDURE

The present cross-sectional study was carried out after taking due permission from the Institutional Ethics Committee. The study was conducted to compare aerobic capacity among non-overweight and overweight postpartum women. According to inclusion and exclusion criteria conset were taken from participants and selected. Total 60 number of patients were taken and make two groups each contain 30 participants, group A (non-overweight postpartum women) group B (overweight postpartum women). Estimation of VO_2 max by queens college step test – It was performed using stepping bench with 16.25 inches height.

Stepping was done for total duration of 3 min at the rate of 22 steps ups/min. After completion of exercise pulse rate was measured from 5th to 20th second of recovery period. It was converted into pulse rate per minute [11].

Following equation as described along with the procedure in McArdle, Katch and Katch's Exercise Physiology was used to estimate VO_2 max expressed in milliliters per kilogram body weight per minute [11].

VO2 max (ml/kg/min) = 65.81 – (0.1847 × pulse rate in beats/ min)

Fig 1- Shapiro-Wilk Test

Data analysis was done using the Statistical Package for Social Sciences (SPSS version 21). Basic descriptions were presented in the form of mean and Standard deviation. The data were assessed for normality using the Shapiro-Wilk test. Independent Sample't' test was used to analyze the differences between non overweight and overweight women. Borg scale was compared using Mann Whitney 'U' test. The level of significance was set at $p < 0.05$ for all tests

- *Outcome Measures*

VO2Max. And Borg Scale

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VI. STATISTICAL ANALYSIS

Information investigation was finished involving the Measurable Bundle for Sociologies (SPSS adaptation 21). Essential depictions were introduced as mean and Standard deviation. The Shapiro-Wilk test was used to determine whether the data were normal. The independent sample t test was used to compare and contrast women who were neither overweight nor obese. The Mann Whitney "U" test was used to compare the Borg scale. For each test, the significance level was set at p 0.05.

VII. RESULT

Consequence of this study was dissected as far as decreased VO2 Max and BORG Score. The independent sample t test was used to compare postpartum women who were not overweight to overweight women. The Mann Whitney "U" test was used to compare the Borg scale. For each test, the significance level was set at p 0.05. BORG Scale and VO2Max both showed significant improvements as a result.

Table 1: Descriptive Statistics

Groups	Minimum	Maximum	Mean	Std. Deviation
Non Overweight				
Age	21.00	30.00	25.66	2.49
BMI	20.20	24.70	23.35	0.86
VO_2 Max	35.10	42.30	37.56	1.78
Borg Scale	1.00	5.00	2.90	1.21
Overweight				
Age	21.00	30.00	26.93	2.28
BMI	24.60	30.00	27.32	1.62
VO_2 Max	32.70	35.30	34.08	0.81
Borg Scale	3.00	7.00	5.13	1.56

Table 2: Comparison of parameters between Non Overweight and Overweight women.

Site	Mean ± SD	Mean Difference	t Value	P value
Age				
Non Overweight	25.66 ± 2.49	1.26	2.049	0.045*
Overweight	26.93 ± 2.28			
BMI				
Non Overweight	23.35 ± 0.86	3.97	11.825	< 0.001*
Overweight	27.32 ± 1.62			
VO_2 Max				
Non Overweight	37.56 ± 1.78	3.48	9.730	< 0.001*
Overweight	34.08 ± 0.81			

Independent Sample't' Test: *P < 0.05 (significant), **p > 0.05 (Not significant)

Table 3: Comparison of Borg scale between Non Overweight and Overweight women

Groups	Mean ± SD	Median	Z Value	P value
Borg Scale				
Non Overweight	2.90 ± 1.21	3.00	4.803	< 0.001*
Overweight	5.13 ± 1.56	5.00		

Mann Whitney 'U' test, P < 0.05 (significant), P > 0.05 (Not significant

VIII. DISCUSSION

In the current study, overweight young women's VO2 Max was found to be significantly lower than that of women of normal weight. This indicates that overweight young women have a significantly lower capacity to complete demanding tasks. Even in overweight females who are below the BMI threshold of 30 kg/m2 required to be classified as obese, a decrease in cardiopulmonary fitness is a significant warning sign. However, it can be explained by looking at how excess fatty tissue affects the physiology of the heart and lungs, which has been studied in a number of studies on overweight and obese people.

BMI and the duration of obesity have been found to be correlated with cardiac function. This means the significance of early recognition and mediation at a beginning phase to forestall the heart illness in overweight/corpulent people. The respiratory system is negatively impacted by obesity, which results in a deviation in respiratory mechanics, a decrease in the endurance and strength of the respiratory muscles, a decrease in the amount of gas exchanged, and restrictions on lung function and exercise capacity. Adipose tissue

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accumulation in the abdominal cavity and chest wall may compress the thoracic cage, diaphragm, and lungs, resulting in impairment of lung function. Lung compliance and diaphragm displacement may be restricted as a result of this. Lung volumes decrease as a result. [31-35]

We used a sample of 60 people from groups A and B, each with 30 people between the ages of 18 and 30 who had a BMI between 25 and 25. These women were put through a three-minute step-up test. As outcome measures, the BORG Scale and VO2Max were utilized. Non-overweight women had a mean VO2Max value of 37.56, while overweight women had a mean value of 34.08; The standard deviation for VO2Max for women who were not overweight was 1.78, while the standard deviation for women who were overweight was 0.81. The BORG Scale for women who were not overweight was 1.21, while the BORG Scale for women who were overweight was 1.56. The fact that the VO2Max and BORG Scale p values were less than 0.001 indicates that the result was highly significant. The cross-sectional design of this study prevents it from commenting on the cause-and-effect relationship between overweight status and aerobic capacity status. Bigger and longitudinal investigations should be finished to additional the figuring out regarding the matter. In order to determine whether weight loss can improve cardiopulmonary efficiency in obese patients, interventional studies can be helpful.

To sum up the lower oxygen consuming limit in overweight females might be an early mark of cardio-respiratory brokenness. We can speculate that obesity has a negative impact on VO2 max because it may reduce one's capacity to maximally consume oxygen. As a result, primary prevention measures are required to manage the overweight/obesity syndrome.

IX. CONCLUSION

The study concludes that aerobic capacity of overweight postpartum women is less than non-overweight postpartum women. There was noticeable difference in VO2Max and BORG Scale

REFERENCES

[1]. Castro LC, Avina RL. Maternal obesity and pregnancy outcomes. Curr Opin Obstet Gynecol. 2002;14(6):601–6.

[2]. Olson CM. A call for intervention in pregnancy to prevent maternal and child obesity. Am J Prev Med. 2007;33(5):435–6.

[3]. Schieve LA, Cogswell ME, Scanlon KS. Trends in pregnancy weight gain within and outside ranges recommended by the Institute of Medicine in a WIC population. Matern Child Health J. 1998;2(2):111–6.

[4]. Gore SA, Brown DM, West DS. The role of postpartum weight retention in obesity among women: a review of the evidence. Ann Behave Med. 2003; 26:149– 59.

[5]. LM Lipsky, MS Strawderman, CM Olson. Maternal weight change between 1and 2years postpartum: the importance of 1 year weight retention: North American Association for the study of obesity (NAASO).2012.

[6]. Ortega FB, Ruiz JR, Castillo MJ, Sj ¨ostr ¨om M. Physical fitness in childhood and adolescence: a powerful marker of health. Int J Obes 2008;32:1–11.

[7]. Vanhees L, Lefevre J, Philippaerts R, Martens M, Huygens W, Troosters T, Beunen G. How to assess physical activity? How to assess physical fitness? Eur J Cardiovasc Prev Rehabil 2005; 12:102–114.

[8]. Guazzi M, Arena R, Halle M, et al. 2016 focused update: clinical recommendations for cardiopulmonary exercise testing data assessment in specific patient populations. Circulation 2016; 133: e694–e711.

[9]. Simons SO, Dubbelink TO, Heijdra YF. Explaining the unexplained: cardiopulmonary exercise testing in the evaluation of chronic unexplained dyspnea. Am J Respir Crit Care Med 2014; 189: A1788.

[10]. Martinez FJ, Stanopoulos I, Acero R, et al. Graded comprehensive cardiopulmonary exercise testing in the evaluation of dyspnea unexplained by routine evaluation. Chest 1994; 105: 168–174.

[11]. Pratter MR, Abouzgheib W, Akers S, et al. An algorithmic approach to chronic dyspnea. Respir Med 2011; 105: 1014–1021.

[12]. Blair SN, Kohl HW III, Paffenbarger RS Jr, Clark DG, Cooper KH, Gibbons LW. Physical fitness and all-cause mortality: a prospective study of healthy men and women. JAMA 1989;262:2395–2401.

[13]. Erikssen G, Liestøl K, Bjørnholt J, Thaulow E, Sandvik L, Erikssen J. Changes in physical fitness and changes in mortality. Lancet 1998; 352:759–762.

[14]. Myers J, Prakash M, Froelicher V, Do D, Partington S, Atwood JE. Exercise capacity and mortality among men referred for exercise testing. N Engl J Med 2002;346:793–801.

[15]. Lee SJ, Arslanian SA. Cardiorespiratory fitness and abdominal adiposity in youth. Eur J Clin Nutr 2007;61:561–565.

[16]. Hurtig-Wennl ¨of A, Ruiz JR, Harro M, Sj ¨ostr ¨om M. Cardiorespiratory fitness relates more strongly than physical activity to cardiovascular disease risk factors in healthy children and adolescents: the European Youth Heart Study. Eur J Cardiovasc Prev Rehabil 2007; 14:575–581.

[17]. Vipa Bernhardt and Tony G. Babb. Exertional dyspnoea in obesity:2016;Eurepean Respiratory Review.

[18]. Shephard RJ, Allen C, Benade AJ, Davies CT, Di Prampero PE, Hedman R, Merriman JE, Myhre K, Simmons R. The maximum oxygen intake: an international reference standard of cardiorespiratory fitness. Bull World Health Organ 1968;38:757–764.

[19]. American Thoracic Society; American College of Chest Physicians. ATS/ACCP Statement on cardiopulmonary exercise testing. Am J Respir Crit Care Med 2003;167:211–277.

[20]. Bar-Or O, Rowland TW. Pediatric exercise medicine: from physiologic principles to health care application. Champaign, IL: Human Kinetics; 2004.

[21]. Pavlou KN, Krey S, Steffee WP. Exercise as an adjunct to weight loss and maintenance in moderately obese subjects. Am J Clin Nutr 1989; 49: 5 Suppl 1115–1123.

[22]. Scano G, Stendardi L, Bruni GI. The respiratory muscles in eucapnic obesity: their role in dyspnea. Respir Med 2009; 103: 1276–1285.
[23]. Bradley PJ. Conditions recalled to have been associated with weight gain in adulthood. Appetite 1985;6:235–241.
[24]. Crerand CE, Wadden TA, Sarwer DB et al. A comparison of weight histories in women with class III vs. class I-II obesity. Surg Obes Relat Dis 2006;2:165–170.
[25]. IOM (Institute of Medicine). Nutrition During Pregnancy. Report. National Academy Press: Washington, DC, 1990.
[26]. IOM (Institute of Medicine). Weight Gain During Pregnancy: Reexamining the Guidelines. Report. National Academy Press: Washington, DC, 2009.
[27]. Ohlin A, Rössner S. Maternal body weight development after pregnancy. Int J Obes 1990;14:159–173.
[28]. Rooney BL, Schauberger CW. Excess pregnancy weight gain and long-term obesity: one decade later. Obstet Gynecol 2002;100:245–252.
[29]. Rössner S. Pregnancy, weight cycling and weight gain in obesity. Int J Obes Relat Metab Disord 1992;16:145–147.
[30]. McArdle WD, Katch IF, Katch LV. Exercise Physiology: Energy, Nutrition and Human Performance. 5th ed. Philadelphia: Lippincott Williams and Wilkins; 2001.
[31]. Faintuch J, Souza SA, Valezi AC, Sant'Anna AF, Gama-Rodrigues JJ. Pulmonary function and aerobic capacity in asymptomatic bariatric candidates with very severe morbid obesity. Rev Hosp Clin Fac Med Sao Paulo 2004;59:181-6.
[32]. Koenig SM. Pulmonary complications of obesity. Am J Med Sci 2001;321:249-79.
[33]. Ladosky W, Botelho MA, Albuquerque JP Jr. Chest mechanics in morbidly obese non-hypoventilated patients. Respir Med 2001;95:281-6.
[34]. Lotti P, Gigliotti F, Tesi F, Stendardi L, Grazzini M, Duranti R, et al. Respiratory muscles and dyspnea in obese nonsmoking subjects. Lung 2005; 183:311-23.
[35]. Rasslan Z, Junior RS, Stirbulov R, Fabbri RM, Lima CA. Evaluation of pulmonary function in class I and II obesity. J Bras Pneumol 2004; 30:508-14.