Cardiac Rehabilitation for Visceral Obesity: A Multidisciplinary Approach

Zara Khalid[1], Iram Gul[2], Furqan Ahmed Siddiqi[3], Farooq Azam Rathore[4]

Abstract

World Health Organization data indicates a marked rise in global obesity, with approximately 30% of the world's population classified as overweight or obese. The contributory factors include unhealthy dietary habits, lack of physical activity, urbanization, and technology dependent sedentary lifestyle. Among the various management approaches, cardiac rehabilitation has evolved from an exercise-only programme for patients with cardiac diseases to a multi-disciplinary individualised intervention plan for risk factor modification, primary and secondary prevention of cardiometabolic diseases. Evidence suggests that visceral obesity is an independent risk factor of morbidity and mortality from cardiometabolic causes. There are multiple training programmes targeting visceral fat oxidation, one of which is high intensity interval training. It appears to be a promising regime, inducing metabolic adaptations in the body. This review summarizes the multidisciplinary cardiac rehabilitation services for the management of visceral adiposity and generalised obesity, its under-utilization and scarcity of local published data, highlighting the need for future research.

Keywords: Adipose tissue, cardiac rehabilitation, cardiometabolic risk factors, high intensity interval training, visceral obesity.

DOI: https://doi.org/10.47391/JPMA.23-31

Introduction

Obesity or overweight are defined as the accumulation of excess amount of fat mass either globally, regionally, or both, which poses a health risk.[1] The distribution of fat and resulting increased body weight leads to development of multiple comorbidities and cardio-metabolic diseases.[1] Obesity has been labelled as a global epidemic due to its rapid rise among every age group all around the world. World Obesity Atlas 2022 predicts that by the year 2030, 1 in 7 males and 1 in 5 females will be obese, equating to over 1 billion individuals worldwide.[2] The World Obesity Federation projection for Pakistan is 3.3% annual increase in adult obesity from 2010-2030 and 8% for child obesity. According to the Global Obesity-Non-Communicable Diseases Preparedness ranking, Pakistan is one of the least prepared countries in Eastern Mediterranean region to address the problem of obesity.[2]

[1,3]Foundation University College of Physical Therapy, Foundation University Islamabad; [2]Department of Behavioral Sciences, Fatima Jinnah Women University Rawalpindi; [4]Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi

Correspondence: Farooq Azam Rathore. e-mail: farooqrathore@gmail.com

Visceral Obesity

In the recent years, the phenomenon of body shape i.e., area of adipose tissue distribution has gained attention for its role in prediction of complications due to obesity. The amount of abdominal or visceral adipose tissue is considered as the most significant correlate of overweight and obesity associated health risks.[3] Visceral fat, mainly in abdominal cavity, acts as an important and active functional organ, producing proinflammatory cytokines and bioactive adipokines namely tumour necrosis factor-α, leptin, interleukin-6, IL-8 and adiponectin which contributes to cardiac changes.[4] Visceral obesity leads to multiple cardiometabolic complications such as impaired insulin sensitivity, increased risk for atherosclerosis, endothelial and cardiac dysfunction. In people with type-2 diabetes, excess proportion of visceral fat has been linked with hypertension, structural and functional changes in the heart and abnormal cardiac haemodynamic parameters. It increases the chances of developing cardiovascular diseases.[5]

Management approaches

International evidence-based guidelines suggest that obesity is to be treated as a chronic disease and should be managed by a multi-disciplinary team of health professionals, aiming for small yet practical approaches to lifestyle changes.[6] Every member of the team including physicians, exercise specialists, dieticians/nutritionists, behavioural therapists/counsellors and nurses contribute their unique expertise and skills for patients' needs. Physicians address the medical issues related to obesity. Dietitians help the patient in learning caloric intake and deficit as well as the incorporation of healthy foods in diet. Exercise specialists/ physical therapists are involved in teaching practical ways to integrate physical activity in daily routine and training of structured exercise regimes to increase caloric expenditure. Behavioural therapists/ psychologists counsel the patients and motivate them to mentally prepare themselves for lifestyle modifications and overcome barriers to change, to achieve their fitness goals. Nurses can encourage and help patients feel more

comfortable in the clinical setting, while also assisting the physicians in the management of obesity related medical complications.[7]

Clinically, the measurement of body mass index and anthropometric measures for instance waist circumference and waist-hip ratio, must be a part of routine while screening and diagnosing various diseases. A comprehensive, multifaceted lifestyle regime focusing on reduction in caloric intake, increase in physical activity and behavioural change measures are recommended for the management of obesity. Surgical options such as bariatric surgery is considered for individuals with body mass index greater than 35 kg/m^2, when all conservative approaches have been unsuccessful. It should be emphasized that weight reduction utilizing any of the aforementioned approaches, should always be followed by weight maintenance strategies in the long-term for achieving complete health benefits.[6]

Cardiac Rehabilitation

Cardiac rehabilitation is a multidisciplinary, structured treatment programme, designed to enhance recovery, limit the progression of a disease, and ultimately improve the quality of life of patients diagnosed with cardiac conditions or after a cardiac event. This comprehensive programme consists of individually tailored activities such as patient education, physical conditioning and behavioural modification to assist optimal recovery.[8] It started as an exercise-only regime for improving the cardiorespiratory fitness, and has evolved into a secondary prevention plan targeting cardiovascular risk factor modification as well.[9] Participation in such programmes provides health benefits such as maintaining blood glucose levels, lipid profile, blood pressure and body weight, enhancing functional capacity and resumption of normal status after recovery from a cardiac event. All of these physiological effects aid in reducing the heavy burden of morbidity and mortality from healthcare systems.[10]

Data from United States reveals that almost 80% patients are overweight and 50% suffer from metabolic syndrome at the time of admission to a cardiac rehabilitation programme, which further compromises and delays their recovery. This highlights the need to include clinically effective weight reduction component and weight loss outcomes as a necessary component of individualized phase-II cardiac rehabilitation plans.[9] In a cardiac rehabilitation programme, interventions addressing weight loss with dietary modifications, high energy expenditure exercise training, and behavioural therapy in a multi-disciplinary approach are the most effective. The main causes of obesity are usually behavioural, originating from lifestyle factors. Therefore, primary, and secondary prevention in cardiac rehabilitation programes should focus on this emerging challenge for better long-term prognosis of patients. Due to a prolonged imbalance between the energy intake and expenditure, the key to address obesity is via creation of negative energy balance and prescription of such exercise which maximizes caloric expenditure.[9]

Exercise training has a crucial role in cardiac rehabilitation. Regular exercise and lifestyle changes targetting increased physical activity have been shown to markedly reduce abdominal fat and visceral obesity, as compared to dietary restrictions. This decrease in visceral adiposity is considered to be even more significant than weight loss as it also improves the cardiovascular and metabolic risk profile.[11]

High intensity interval training

The guidelines by American College of Sports Medicine recommend moderate intensity continuous training for weight loss in obese patients, as it can be maintained for an extended duration and it promotes positive cardio-metabolic effects along with little fat loss.[12] Emerging evidence suggests that high intensity interval training (HIIT) might be more beneficial. An HIIT programme comprises of repetitive bouts of high intensity workout, followed by recovery period. It has few main components: peak workload intensity, peak workload duration, recovery load and duration, number of repetitions, number of sets, and duration and intensity phases between sets. This is a safe and time-efficient strategy and has been linked to a greater abdominal and visceral adipose tissue reduction as compared to low or moderate intensity endurance training.[13] The underlying proposed mechanism of HIIT-induced visceral fat loss might be somewhat due to greater lipolysis and higher abdominal and total fat oxidation post-workout. This is facilitated by excess oxygen consumption after exercise performance above 75% of VO2 max.[14] HIIT is a well-tolerated and efficient modality to decrease central obesity making it favourable for reducing the risks of cardiovascular diseases. However, it is being under-utilized for this purpose and research is needed to fully explain the underlying mechanisms of HIIT-induced visceral fat loss. HIIT protocols were initially practiced in high-level athletes for increasing their maximal oxygen consumption or VO2. Lately this regime is also being applied in patient populations. However, the utility of HIIT for fat mass loss in overweight and obese patients is more recent. Additional multi-center research should be carried out using well-designed prospective trials for establishment of ideal HIIT protocols to decrease adiposity in accordance with individual subject characteristics.[13]

Future Directions

Obesity is rising in Pakistan and there is an urgent need to control it by formulation of policies and strategies at national level. These may include implementation of the global strategy by WHO on diet, health, and physical activity. Other than the individual weight management regimes, economical and societal innovations are needed with focus on preventing further rise in rate of obesity. This nation-wide movement would require integration and cooperation from all concerned stakeholders including print and social media, department of health, non-governmental organizations, and private sectors. Adoption of a healthy lifestyle, regular physical activity and balanced diet intake is the key to maintain a healthy weight and body. Furthermore, most of the data regarding obesity and the different treatment strategies is available from the developed countries. Developing countries also need to address this public health issue and generate high quality research data which can be clinically implemented and benefit the masses.[15]

Conclusion

Despite of its high global burden, obesity is still not receiving attention as an important public health problem and a chronic disease in Pakistan. It should be realized that there is no single remedy for gaining a healthy weight. Ideally obesity should be managed by a multidisciplinary team of health professionals including physician, exercise specialists/ physical therapists, dietician/nutritionist, and nurses. Cardiac rehabilitation programme, using different intensities and volumes of exercise training protocols can target visceral adipose tissue by fat oxidation. Hence, through the modification of risk factors, cardiac rehabilitation services can also play a vital role in primary and secondary prevention of cardio-metabolic diseases. However, steps must be taken at national and societal level to address the rapid rise in obesity in children, adolescents as well as adult population. Considering this, further research should focus on determining effective treatment and prevention strategies for obesity which could be implemented at community level.

Conflict of interest: None to declare

Funding disclosure: None

References

1. Purnell JQ. Definitions, Classification, and Epidemiology of Obesity. In: Feingold KR, Anawalt B, Boyce A, Chrousos G, de Herder WW, Dhatariya K, et al., editors. Endotext. South Dartmouth (MA): MDText.com, Inc. 2000.
2. Lobstein T, Brinsden H, Neveux M. World Obesity Atlas 2022. 2022.
3. Després JP. Excess visceral adipose tissue/ectopic fat the missing link in the obesity paradox? J Am Coll Cardiol. 2011;57:1887-9.
4. Jensen MD. Visceral fat: culprit or canary? Endocrinol Metab Clin. 2020;49:229-37.
5. Qiu Y, Deng X, Sha Y, Wu X, Zhang P, Chen K, et al. Visceral fat area, not subcutaneous fat area, is associated with cardiac hemodynamics in type 2 diabetes. Diabetes Metab Syndr and Obes. 2020;13:4413.
6. Semlitsch T, Stigler FL, Jeitler K, Horvath K, Siebenhofer A. Management of overweight and obesity in primary care—A systematic overview of international evidence-based guidelines. Obes Rev. 2019;20:1218-30.
7. Blackburn GL, Greenberg I, McNamara A, Rooks D, Fischer S, Day K. The multidisciplinary approach to weight loss: defining the roles of the necessary providers. Bariatric Times. 2008.
8. Cowie A, Buckley J, Doherty P, Furze G, Hayward J, Hinton S, et al. British Association for Cardiovascular Prevention and Rehabilitation (BACPR). Standards and core components for cardiovascular disease prevention and rehabilitation. Heart. 2019;105:510-5.
9. Ades PA, Savage PD. The treatment of obesity in cardiac rehabilitation: a review and practical recommendations. J Cardiopulm Rehabil Prev. 2021;41:295-301.
10. Ji H, Fang L, Yuan L, Zhang Q. Effects of exercise-based cardiac rehabilitation in patients with acute coronary syndrome: a meta-analysis. Med Sci Monit. 2019;25:5015.
11. Verheggen RJHM, Maessen MFH, Green DJ, Hermus ARMM, Hopman MTE, Thijssen DHT. A systematic review and meta-analysis on the effects of exercise training versus hypocaloric diet: distinct effects on body weight and visceral adipose tissue. Obes Rev. 2016;17:664-90.
12. Donnelly JE, Blair SN, Jakicic JM, Manore MM, Rankin JW, Smith BK. 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;41:459-71.
13. Maillard F, Pereira B, Boisseau N. Effect of high-intensity interval training on total, abdominal and visceral fat mass: a meta-analysis. Sports Med. 2018;48:269-88.
14. Vissers D, Hens W, Taeymans J, Baeyens J-P, 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.
15. Khalid Z, Babur MN, Siddiqi FA. The Obesity Epidemic: Call for Physical Activity and Exercise. J Coll Physicians Surg Pak. 2022;32:556.