SRYAHWA PUBLICATIONS

Open Access Journal of Internal Medicine
ISSN: 2638-5279 | Volume 6, Issue 1, 2024
https://doi.org/10.22259/2638-5279.0601002

RESEARCH ARTICLE

Impact of an Obesity Rehabilitation Program in a Tertiary Care Hospital, Dhaka, Bangladesh

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Received: 01 March 2024 Accepted: 08 March 2024 Published: 11 March 2024
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Abstract

Introduction: The context discusses the global prevalence and consequences of overweight and obesity, which are classified based on body mass index (BMI). Obesity is attributed to a complex interplay of genetic, behavioral, and environmental factors, with urbanization and lifestyle changes contributing to its rise even in underdeveloped countries. It leads to severe health conditions such as cardiovascular diseases, diabetes, and certain cancers, increasing morbidity and mortality rates. Management includes strategies such as diet therapy, physical activity, pharmacotherapy, and surgery, often implemented within multidisciplinary rehabilitation frameworks.

Aim of the Study: This study aimed to assess the impact of a rehabilitation program on adult obese patients in Dhaka, Bangladesh.

Methods: This is a cross-sectional prospective study conducted within the Department of Physical Medicine and Rehabilitation, Shaheed Monsur Ali Medical College, Dhaka, Bangladesh, From January 2023 to December 2023. Participants aged 18-65, with a BMI over 30kg/m2 and recovering from low back pain or musculoskeletal disorders, underwent functional rehabilitation. Exclusions included those with certain medical conditions or pregnancy. Regular physical exams assess readiness for physical activity.

Result: The study analyzed 212 participants, predominantly males, with a mean age of 45.55 years. Most had completed either H.S.C or Graduate degrees, and various professional backgrounds were represented. Anthropometric and lipid characteristics showed a mean BMI of 35.65 kg/m² and FMI of 46.89±7.66. The six-minute walk test indicated a mean distance of 490.23±75.22 meters. Waist-related measurements varied within clinically significant bounds. Factors related to FMI outcomes, including obesity types, showed non-significant differences. Similar findings were observed for BMI outcomes, triglyceridemia, total cholesterolemia, and the six-minute walk test between the two groups.

Conclusion: Significant improvements in health indicators like BMI, FMI, waist circumference, and lipid levels were observed through physical therapy, dietary counselling, and behavioural interventions. Multidisciplinary collaboration and personalized interventions were crucial in addressing obesity-related complications, showcasing the program's potential for enhancing healthcare outcomes.

Keywords: Obesity, rehabilitation, FMI and BMI.

Citation: Shaila Sharmin Shahnewaz, Rajee Mahmud Talukder, Dr. Maksuda Begum, *et al.* Impact of an Obesity Rehabilitation Program in a Tertiary Care Hospital, Dhaka, Bangladesh. Open Access Journal of Internal Medicine. 2024;6(1): 07-13.

1. Introduction

Normally, overweight and obesity is defined as unwanted weight gain where, the weight of a person is higher than what is considered to be a normal weight for a given height [1]. Obesity is generally measured using body mass index (BMI). According to the classification by the World Health Organization (WHO), a BMI below 18.49 kg/m² is categorized as underweight. The normal BMI range is considered to be between 18.5 and 24.99 kg/m². A BMI greater than 25 kg/m² is classified as overweight, with 25 to 29.99 kg/m² being labeled as pre-obese, and a BMI exceeding 30 kg/m² being categorized as obese [2]. It is currently recognized as a chronic disease and has emerged as a major contributor to the global increase in chronic, non-communicable diseases [3]. Presently, around 650 million adults and roughly 340 million children and adolescents (aged 5-19 years) are affected by obesity [4]. In the United States, the obesity rate among adults has reached 42.4%, exceeding 40% for the first time [5]. In Bangladesh, the overall prevalence of overweight and obesity is 29.4% and 10.8%, respectively [6]. The prevalence of obesity has nearly doubled in the past generation. Despite recent advancements in understanding the molecular genetics of obesity, genetic influences are unlikely to fully explain the rapid changes in obesity prevalence seen in recent times. Obesity is instead believed to result from a complex interaction of genetic, behavioral, and environmental factors, including diet and exercise habits [7]. Certainly, obesity is no longer confined to developed nations, as we witness progressive urbanization and shifts in lifestyle, particularly regarding dietary patterns and sedentary behaviors, in populations of underdeveloped countries as well [8]. Obesity has a range of consequences, including cardiovascular diseases such as heart disease and stroke, diabetes, musculoskeletal disorders, and certain cancers such as endometrial, breast, and colon cancer. These health conditions significantly elevate both morbidity and mortality rates. Given the heightened risk associated with obesity, it is crucial for healthcare providers to diligently screen patients and offer effective evidence-based treatment strategies. Its management includes diet therapy, physical activity, behavioral therapy, pharmacotherapy and surgical procedures as appropriate [9,10]. In the setting of in-patient rehabilitation, interventions focused on weight loss, mitigating obesity-related complications, and modifying maladaptive behaviors are typically conducted within a multidisciplinary framework. This entails a clinical team comprising various professionals such as dieticians, endocrinologists or nutritionists, physiotherapists, psychiatrists, psychologists, surgeons, among others. Additionally, incorporating specific dietary guidelines and implementing self-monitoring techniques for dietary intake can offer added benefits. Providing ongoing guidance and support for maintaining achieved goals, preemptively addressing potential relapses, and imparting coping strategies for challenging circumstances are also integral components of the rehabilitation process [11]. Various psychological approaches can be effective for in-patient treatment of obesity, including behavioral therapy, cognitive-behavioral therapy (CBT), interpersonal therapy, systemic-strategic therapy, psychodynamic therapy, schema therapy, and others [12]. This study aimed to assess the impact of a rehabilitation program on adult obese patients in Dhaka, Bangladesh.

2. Methodology and Materials

This is a cross-sectional prospective study conducted within the Department of Physical Medicine and Rehabilitation, Shaheed Monsur Ali Medical College, Dhaka, Bangladesh, From January 2023 to December 2023**.** The study focused on recruiting obese individuals who were admitted to the department for various reasons such as obesity, low back pain, or other musculoskeletal disorders. Over one year, from [start date] to [end date], a total of 212 participants were recruited and analyzed for the study.

2.1 Inclusion Criteria

- Individuals aged between 18 and 65 years.
- Both males and females.
- Individuals with a body mass index (BMI) exceeding 30 kg/m2.
- Participants who have substantially recovered from pain associated with low back pain or musculoskeletal disorders.
- Participants are undergoing conventional functional rehabilitation sessions.

2.2 Exclusion Criteria

- Individuals with contraindications to physical activity, such as unstable angina, ventricular rhythm disorders, and obstructive cardiomyopathies.
- Pregnant women.

A rehabilitative medical doctor conducts regular physical examinations to identify any contraindications to sustained physical activity, utilizing measures such as the Fat Mass Index (FMI) and assessing lipid levels, including total cholesterol,

HDL, LDL, and triglycerides. Additional assessments include an exercise test on a cycle ergometer to determine maximum resistance and heart rate and a six-minute walk test to evaluate distance traveled and dyspnea. These sessions, led by a nutritionist and a medical doctor specializing in physical medicine and rehabilitation, occur monthly. Before completing their 20th exercise program, each patient participates in two sessions focusing on dietary habits. The first session involves tailored recommendations for each patient, while the second evaluates their adherence to the recommendations provided during the initial session.

2.3 Evolution of Variables

The study focused on several health indicators, including Body Mass Index (BMI), Fat Mass Index (FMI), seated abdominal perimeter, waist circumference, and total, HDL, and LDL cholesterol levels. Changes in these parameters were analyzed by comparing values at the beginning and end of the study session. Each subject was categorized based on the evolution of these variables. Improvement was noted for subjects whose initial values were higher than their final values, except for HDL cholesterol levels, where a decrease from the initial value determined improvement. The average improvement for each parameter was calculated, and if a subject's improvement exceeded or fell short of this average, it was categorized as either slight or significant improvement, respectively.

2.4 Data Analysis

The data were organized into tables and graphs, each tailored to reflect their relationships effectively. Accompanying descriptions were provided for clarity in interpreting these visual representations. Statistical analyses were conducted using the Statistical Package for Social Science (SPSS) software on a Windows platform. Continuous variables were presented as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages. Group comparisons for continuous variables were carried out using Student's t-test, while categorical variables were assessed with the Chi-Square test. Statistical significance was determined at a p-value threshold of less than 0.05.

3. Results

In this cross-sectional prospective study, a total of 212 participants were recruited and analyzed. More than 35% of the study patients were aged under 46-55 years, and the mean±SD of the age was 45.55±9.86 years (Table 1). Figure 1 illustrates the gender distribution, where most patients were males (94.34%), and the rest (5.66%) were female. The majority of participants have completed either Higher Secondary Certificate (H.S.C) education (37.74%) or hold Graduate degrees (25.00%) (Table 2). Table 3 outlines the professional backgrounds of the study population: 32.08% of patients were workers, 27.83% were civil servants, and 15.57% were housewives, respectively. Table 4 provides a nuanced portrayal of anthropometric and lipid characteristics, showcasing a mean body mass index (BMI) of 35.65 kg/m², ranging from 30 to 60. Fat Mass Index (FMI) averages 46.89±7.66, ranging from 30 to 80. The six-minute walk test highlights participants' physical endurance, with a mean distance of 490.23±75.22 meters. Waist-related measurements, including seated abdominal perimeter (115.69±11.85 cm) and waist circumference (105.88±10.55 cm), depict variations within clinically significant bounds. Table 5 summarizes factors related to Fat Mass Index (FMI) outcomes, showing comparable proportions of Androïde and Mixte obesity types with a non-significant p-value (0.95). No significant differences exist in triglyceridemia, total cholesterolemia, and the 6-minute walk test between the two groups (Good and Poor), as indicated by non-significant p-values. Table 6 provides a comprehensive overview of factors associated with Body Mass Index (BMI) results. The distribution of Androïde and Mixte obesity types is comparable, with a non-significant p-value (0.75). Additionally, no notable differences exist in triglyceridemia, total cholesterolemia, and the 6-minute walk test between the two groups, as evidenced by non-significant p-values in this study.

Table 1. *Age distribution of the study population (N=212).*

Age group (in years)	Frequency (n)	Percentages (%)
≤35	28	13.21
36-45	61	28.77
46-55	75	35.38
>55	48	22.64
Total	212	100.00
Mean±SD	45.55 ± 9.86	

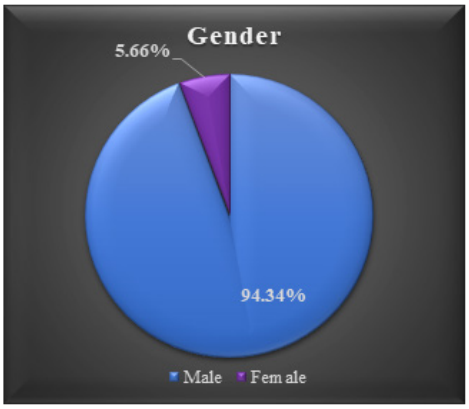

Figure 1. *Gender distribution of the study population (N=212).*

Table 2. *Educational qualification of the study population (N=212).*

Education	Frequency (n)	Percentages (%)
None	8	3.77
Below primary	35	16.51
S.S.C	36	16.98
H.S.C	80	37.74
Graduate	53	25.00
Total	212	100.00

Table 3. *Professional background of the study population (N=212).*

Profession	Frequency (n)	Percentages (%)
Civil servant	59	27.83
Housewife	33	15.57
Student	30	14.15
Worker	68	32.08
Others	22	10.38
Total	212	100.00

Table 4. *Distribution of patients according to their anthropometric and lipid characteristics.*

Variables	Mean±SD	Min-Max
BMI (kg/m^2)	35.65±5.21	30-60
FMI (en%)	46.89±7.66	30-80
Distance walked in 6 min (m)	490.23±75.22	275-665
Seated abdominal perimeter (cm)	115.69±11.85	100-140
Waist circumference (cm)	105.88±10.55	90-120
Triglyceridemia (g/l)	1.00±0.28	0.25-2.5
Total cholesterolemia (g/l)	2.15±0.52	1.25-4.0
HDL cholesterolemia (g/l)	0.48±0.21	0.25-2.0
LDL cholesterolemia (g/l)	1.35±0.5	0.75-3.0

Table 5. *Summary of factors associated with FMI results in the study patients.*

Type of obesity	Good (N=193)		Poor (N=19)		P-value
	n	%	n	%	
Androïde	89	46.11	8	42.11	0.95
Mixte	104	53.89	11	57.89	
Variables	Mean±SD		Mean±SD		
Age	46.52±9.67		44.73±10.24		0.546
Triglyceridemia	0.92±0.34		1.12±0.56		0.554
Total cholesterolemia	2.16±0.45		2.24±0.49		0.537
6 min walk test	490.33±75.6		501.27±68.75		0.665

Table 6. *Summary of factors associated with BMI results in the study patients.*

Type of obesity	Good (N=193)		Poor (N=19)		P-value
	n	%	n	%	
Androïde	82	46.59	15	41.67	0.75
Mixte	94	53.41	21	58.33	
Variables	Mean±SD		Mean±SD		
Age	46.24±9.79		46.95±9.42		0.772
Triglyceridemia	0.93±0.25		0.97±0.16		0.645
Total cholesterolemia	2.16±0.42		2.17±0.59		0.876
6 min walk test	490.99±78.18		492.9±57.33		0.923

4. Discussion

The study population consisted of 212 participants. The age distribution of the study population shows a varied representation across different age groups, with the largest proportion falling within the 46-55 age range of 35.38% and smallest proportion failing within the young group with 13.21%. Similar study showed highest proportion (35.25%) of obesity at 45-54 age and lowest (13.11%) at <35 age [13]. The sample of our study was marked by a predominantly female with 94.34% against 5.66% of male. The female predominance of obesity in our context could be explained by the fact that: a) "curves" of a woman testify to the maintenance that she has on behalf of her husband, even of all her family in law, b) woman is the main actress in the kitchen and could therefore be tempted by snacking, c) women often have sedentary jobs, d) culture of "outdoor sports by women" is not yet a daily reality, e) numerous deliveries, certainly also have their implication. In 2012, Djrolo et al. reported this female prevalence of obesity in Benin, even if it was to a lesser extent [14]. But, in others epidemiological studies, it appears that obesity is predominantly male [15,16]. Their study carried out in Switzerland, experienced a majority participation of women at 86% [16]. The average BMI of our population was 35.65 ± 5.21 kg/m2. This result is comparable to that of Gaillard et al. with an average BMI of 37.7 kg/m2 and with an average BMI of 36.4 kg/m2 [17]. The average fat mass index of the study subjects was 46.89 ± 7.66%. This is therefore a significant excess of fat mass index in these subjects. These parameters certainly contributed to a reduction in the endurance of the subjects with physical activity. In fact, if obese subjects in the study by Baillot et al. were older than ours, the average performance of the latter on the six (6) minutes' walk test was reduced [18]. The average values of the lipid balance in the subjects of the study were generally good. This result confirms that the diagnosis of obesity is only clinical. The study subjects experienced an improvement in the clinical parameters of obesity (focusing mainly on the abdominal perimeter, waist circumference, fat mass index and to a lesser extent on the body mass index). Comparable results have been reported according to the literature review [19,20]. As for the biological parameters, their improvement was less marked. These results could be due to the fact that the initial biological disturbances observed in the subjects of the study were not marked. Watts et al. results were comparable to ours [21]. On the other hand, Nicklas et al. have reported a significant reduction in triglyceridemia, total and LDL cholesterolemia following physical endurance training in obese patients [22]. As for Sunami et al. obtained a significant increase in HDL cholesterolemia after pedaling an ergometric bicycle at an intensity of 50% of the theoretical maximum load, for 60 minutes two to four times a week for 5 months [23]. These points of divergence observed in the results would be due to the great heterogeneity of the studies, as much for the type of program, its duration, the type of population studied as well as the size of the sample. Indeed, in the literature we observe a diversity of exercise programs for obese. It is either a high- intensity interval training program, an aerobic-dominated exercise program [20,24]. The duration of programs is either short (6 to 8 weeks), or long (12 weeks and more) [20,21,24]. Results of physical activity on the lipid balance would be mainly related to the duration of the program, according to Brandou et al. [25]. Subjects of the study presented mainly android and mixed obesity. Still in Benin, but in 2004, Dansou et al. reported android obesity for all subjects in their sample [17]. Regardless of parameters studied, none of them had any influence on the results of the fat mass index or on those of the body mass index. These results are interesting and encouraging because they demonstrate the benefits to be hoped from the effort training sessions of the subjects does not take into account the type of their obesity, the age of patient, his functional capacities or the results of his lipid status.

5. Limitations of the Study

Despite the comprehensive analysis conducted in this study on the impact of an obesity rehabilitation program in a tertiary care hospital in Dhaka, Bangladesh, several limitations should be acknowledged. Firstly, the study design, which is cross-sectional and prospective, limits the ability to establish causality between the rehabilitation program and observed outcomes. Additionally, the study's relatively short duration (one year) may not capture the program's long-term effects. Moreover, the study sample predominantly comprises females, potentially skewing the generalizability of the findings. Furthermore, the absence of a control group hinders comparisons and robust conclusions about the program's effectiveness.

6. Conclusion and Recommendations

In conclusion, this study underscores the profound impact of a rehabilitation program on adult obese patients in Dhaka, Bangladesh. With a comprehensive approach encompassing physical rehabilitation, dietary counselling, and behavioural interventions, significant improvements were observed in various health indicators, including Body Mass Index (BMI), Fat Mass Index (FMI), abdominal perimeter, waist circumference, and lipid levels. Despite the challenges posed by obesity, the findings highlight the efficacy of structured rehabilitation programs in ameliorating obesity-related complications and enhancing overall well-being. The study underscores the importance of multidisciplinary collaboration and personalized interventions in addressing the complex nature of obesity, paving the way for improved healthcare outcomes in similar settings.

Funding

No funding sources

Conflict of Interest

None declared

7. References

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