“THE EFFECTIVENESS OF AEROBIC EXERCISE ON OBESE AND OVERWEIGHT CHILDREN: A QUASI EXPERIMENTAL STUDY”

Nursing

**Ms. Richa R
Jadhav**

M.sc Nursing, Department of Community Health Nursing, D.Y. Patil College of Nursing, Kolhapur.

**Mr. Shivagouda
Patil***

M.sc Nursing, Department of Community Health Nursing, D.Y. Patil College of Nursing, Kolhapur. *Corresponding Author

ABSTRACT

Background: Childhood obesity has become an epidemic in the recent years. Reports suggest that children suffering from obesity are predisposed to obesity in adulthood as well the many related comorbidities like hypertension, diabetes, etc. Therefore, it is necessary to develop programs to curb obesity early on. **Aim:** To study the effectiveness of aerobic exercise on obese and overweight children **Methodology:** A quasi-experimental study carried out at two schools in Kolhapur, Maharashtra (n=30, control and experimental each). A pilot study was first carried out in two schools (n=8), followed by the main study. Post discussions with the experts in the field, a questionnaire tool was developed and validated. Overweight and obese adolescents were included in the study. Anthropometric parameters like height, weight, body mass Index were recorded, and aerobic exercise intervention was provided for a month by a trained instructor. After one-month anthropometric measurements were taken again. Difference between the parameters were calculated by Wilcoxon signed rank test. P-value of <0.05 was considered as significant. **Results:** There was a significant reduction in the weight (P=9.14e-07), BMI (P= 1.805e-06) and waist to hip ratio (P=0.0005) in the experimental group as opposed to control group where no difference was observed. **Conclusion:** Aerobic exercise has a significant effect on the reduction of weight in obese and overweight adolescents and should be considered in schools and at community levels

KEYWORDS

Obesity, Intervention, Aerobics, Weight, BMI

INTRODUCTION:

Obesity is a multifactorial disease, and a leading cause for many other lifestyle disorders. The prevalence of obesity in the world is on a rise with an estimated 30% of the world's population being obese. It is also anticipated that if similar trends continue, about 38% of the world's population will be overweight, while 20 % will be obese by 2030 —(1). According to a report of World Health Organization's (WHO), around 2.8 million people globally, die of obesity every year —(2). The centre for disease control and prevention (CDC) has reported a prevalence 18.5% in children and adolescents between 2-19 years of age and 20.6% specifically among 12- to 19-year-olds (adolescents) in the United States —(3). A meta-analysis of the obesity prevalence among adolescents in Asia revealed an overall 8.6% of the people suffering from obesity. Additionally, the percentage of overweight adolescents in the population was 14.6%. Prevalence studies in India have indicated a rise in the overall obesity rates through the years (4), (5), (6). An Indian Council of Medical Research (ICMR) study showed that there was a prevalence of 16.6 % and 18.7% in general and abdominal obesity in the Maharashtra population (7). The fraction of boys suffering from obesity and overweight were more, compared to the number of girls (8).

Obesity is known to be a trigger for many other lifestyle disorders. Overweight and obesity mostly occur due to excess calorie intake and insufficient physical activity (9). Other factors like genetics, environment, food habits and societal changes have been linked to cause obesity (10). Urbanization and affluence have also been advocated to influence obesity (5).

Despite being a global health challenge, there are only a handful of studies in India, which have emphasized on the importance of any form of exercise on tackling obesity in adolescents (11)(12). It is essential to try and implement strategies to reduce obesity, especially in children and adolescents, so as to ensure that they develop into healthy adults. The present study is aimed at studying the effects of the intervention of aerobic exercise on overweight adolescents the Kolhapur population of Maharashtra, India.

METHODOLOGY:

Development and validation of the tool: Post an extensive literature survey and discussion with peers on the topic, a questionnaire (tool) was developed. Validation of the tool was done by 17 experts from Community Medicine Nursing, MD paediatrics and a statistician. Following their suggestions necessary modifications were made and final questionnaire was designed.

Study design, data collection and pilot study

The Quasi experimental study was undertaken in overweight and obese adolescents between 12-16 years of age from two schools in the Kolhapur for a period of one month (10/2/17-10/3/17). Sample selection was done by non-probability, purposive sampling technique. Schools were chosen by lottery method on the basis of feasibility in terms of availability of overweight and obese children. Data collection commenced after receiving approval from the school authorities and a written consent from the parents. Adolescents present during the data collection from both genders were included in the study. Those suffering from any kind of illness or not able to perform aerobic exercise were excluded. The effectiveness of the intervention (aerobic exercise) on overweight and obese adolescents was evaluated with the tool by comparing preintervention and post intervention test values. Weighing machine and measuring tape was used to measure physical parameters (Body Mass Index and Waist Hip Ratio). Body mass index (BMI) was calculated as weight divided by height and Waist hip ratio was calculated as weigh circumference divided by hip circumference. Participants were graded as, obese (30- 32 Kg/m²), overweight (27 - 29 Kg/m²) and healthy weight (20 - 26 Kg/m²). Overweight and obese participants formed the experimental group, while the remaining formed the control group. High intensity aerobics exercise was demonstrated to the experimental group by the investigator a certified aerobics instructor. Following which they were made to perform the same. A total of 23 aerobic exercises (marching, jogging, running, shoulder roll, shoulder scoop, heartbeat, chest and back stretch, reach out, AB isolation, easy walk, serve & throw, roll and circle, drums, hip lock, neck stretching, circle neck, cross walk, shuffles, grape wine, hamstring, frog jump, stretching's and frog stretching) were conducted for a period of 43 minutes for 4 weeks on a daily basis. Preintervention data was collected on the first day of the study. Post intervention data was collected after one month of the intervention.

A pilot study was conducted on 8 participants from Mazhi Shala, Sausankar High School, Kolhapur (Experimental group) and International Sanjeevani School, Kolhapur (Control group). The main study was conducted at Esther Patton High School, Kolhapur (Experimental group) and Bharati Vidyapeeth English Medium High School, Kolhapur (Control group).

Statistical analysis: Descriptive data analysis was performed on MS-Excel of the office 365 package. Significant difference between pre and post test scores were calculated by Wilcoxon signed rank test.

RESULTS:

There were a total of 60 adolescents, with 30 in each group who were

selected based on the inclusion criteria. The questionnaire comprised of 2 parts. Part-1, section A comprised of questions relating to socio-demographic parameters of the participants like age, gender, educational status, religion, dietary pattern and monthly family income. Section B comprised of questions regarding their lifestyle and level of physical activities. Part II contained Proforma for physical parameters like height (cms), weight (kg), Body Mass Index (BMI; kg/m²) and waist/hip ratio.

Table 1 represents the anthropometric parameters of the participants in

Table-1 Physical parameters of the experimental group (N=30).

Variables	Mean		Median	SD	Minimum	Maximum	P-value
Height (cms)	143.47		143	4.006	134	155	NA
Weight (kgs)	Pre	57.87	57	4.696	49	68	9.14E-07
	Post	56.37	55	4.716	48	66	
BMI	Pre	28	27.5	1.259	27	31	1.81E-06
	Post	27.47	27	1.43	26	30	
Waist to hip ratio (kg/m2)	Pre	0.92	0.91	0.055	0.85	1	0.0005

DISCUSSION:

Obesity has become a global health issue. The incidences of obesity have been increasing at an alarming rate in India. The current statistics has predicted an overall incidence of childhood obesity to be 19.3% (13). Earlier reports suggest that more than 80% of overweight adolescent become obese adults. The odds of adult obesity were twice as high for obese children as compared to non-obese children (14)(15). Children suffering from obesity are also at an increased predisposition to a myriad of other diseases like type 2 diabetes, hypertension, cardiovascular diseases (CVD) with more likeliness of premature onset. Major adverse outcomes of childhood obesity include early onset of atherosclerosis, insulin resistance, polycystic ovarian syndrome (PCOS), depression, low self-esteem, etc. (16).

Although, it has been suggested that childhood obesity is more in children and adolescents from higher socioeconomic class (11), a recent review study also suggested that obesity among children and adolescents is on a rise not only in the higher economic groups but also in lower income groups, even though malnutrition still remains a major concern. This issue is much of a concern in Indian scenario where malnutrition is a challenge and thus can directly be associated with the dietary habits of children and adolescents (13). Eating habits like junk food and lack of physical activities, habit of sleeping in the afternoon were shown to impact obesity among middle and high socioeconomic group. A history of obesity and diabetes were also associated with childhood obesity (11). Thus, the identification of obesity early on in childhood and adolescence is quite useful and ought to provide a chance for timely action in addressing obesity.

Physical activities like exercise, aerobics, swimming and yoga have been shown to have a positive impact on combating obesity in children suffering from childhood obesity (17). In a particular study, a 12-week high-intensity exercise intervention resulted in significant reduction of body weight, body fat and waist circumference (18). Similarly, Lison et al demonstrated positive impact of home based exercise in fat mass and waist circumference reduction (19). Yoga intervention was also shown to significantly reduce weight, BMI, hip circumference and fat percentage in a randomized controlled trial study by Rath et al (20). The positive benefits of exercise and aerobics on obese children and adolescents have also been reported in several other studies as well (21) (22). All these studies are in close agreement with our study, which also demonstrated a significant reduction in the weight, BMI and waist to hip ratio, advocating the usefulness of aerobic exercises in tackling obesity in adolescents. It is also particularly useful as it is interesting to perform, is easily reproducible and do not require special equipment, making it cost effective.

Owing to the current and projected health issues of childhood obesity, there is a need to develop efficient strategies for the management of obesity in children and adolescents. This study might prove useful in this context. Despite the small sample size, positive outcomes of the implementation of aerobic exercises was observed, in terms of weight loss and reduced BMI. We believe that it can act as a functional model system for developing practical and cost-effective strategies in order to curb the epidemic of childhood obesity at community and school level and should be considered by the government of Maharashtra. Inculcating aerobics along with other proven interventions in schools like nutritional educational program, lifestyle education, PowerPoint

the experimental group. The weight of children in the experimental group reduced significantly ($P=9.14e^{-07}$) as compared to the control group. Consequently, there was also a significant difference in the BMI of the children pre- and post- aerobic exercise intervention in the experimental group was observed ($P= 1.805e^{-06}$). However, in the control group no difference in pre and post BMI was observed. Similarly, a significant difference in the waist to hip ratio, pre and post aerobic exercise was observed, in children belonging to the experimental group ($P=0.0005$), as opposed to the control group, where no difference was observed.

presentations addressing the burden and causes of obesity is expected to combat obesity early on, thereby preventing obesity in the adulthood (23)(24)(25).

CONCLUSION:

Intervention of aerobic exercise significantly reduced weight, BMI and waist to hip ratio in the experimental group. The intervention might serve as a model for implementing aerobic exercise intervention at school and community levels to curb childhood and adolescent obesity.

CONFLCITS OF INTEREST:

None

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