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Dr. Mulkhede SV
Assistant Lecturer,
Department of physiology,
MGM College, Aurangabad,
Maharashtra, India

Dr. Irani FB
Assistant Professor,
Department of physiology,
MGM College, Aurangabad,
Maharashtra, India

Correspondence
Dr. Irani FB
Assistant Professor,
Department of physiology,
MGM College, Aurangabad,
Maharashtra, India.

Cardiac autonomic function in MBBS students of private medical college

Dr. Mulkhede SV and Dr. Irani FB

Abstract
Introduction: Obesity a major risk factor for many acute and chronic disorders/ including cardiovascular and cerebrovascular disease and diabetes.
Method: A total of 40 non obese and 40 obese medical students in age group of 18-22 years who have satisfied inclusion and exclusion criteria and have consented to participate in study were enrolled. Each enrolled subjects BMI was recorded and evaluation of autonomic function was done using Hand grip dynamometry and orthostatic tolerance test (OTT).
Result: There was significant difference in autonomic parameters values between obese and non obese students, indicative of deranged autonomic and cardiac functions in obese. This indicates implementation of early interventional programs (weight reduction, life style changes and physical exercise) to prevent obesity related cardiovascular sequelae in future.

Keywords: BMI, Blood pressure, Autonomic functions

Introduction

Obesity is a disorder of energy balance affecting wide range of people belonging to diverse ethnic groups, age and socioeconomic status. Prevalence of overweight and obesity is increasing in adolescents in India which is a concern in terms of the complications being seen in the later stage of life if not taken care of in time [1].

The causes of obesity are manifold that include lack of regular exercise, sedentary habits, over consumption of high calorie foods, and genetic, prenatal and early life factors [2]. Obesity has been found to have a positive correlation with endocrinal dysfunction, lipid profile, hypertension, insulin resistance and morbidity from coronary heart disease in adulthood [3].

The direct effects of the obese state on heart function, and the means by which excessive body fat might be negatively affecting cardiac health during the growing years, however this has received less attention. It is well-recognized that cardiac mass and chamber dimensions are increased in the obese adult, which is reflected in a greater resting stroke volume and cardiac output. Given sufficient duration and/or severity of obesity, this hyperkinetic state is supplemented by increasing evidence of systolic and diastolic myocardial dysfunction, which may progress to overt clinical heart failure. The cause of this myocardial dysfunction is unclear, but chronic volume overload, insulin resistance, autonomic changes, and local metabolic derangements have all been implicated as possible etiologic factors. This information is beginning to emerge as the effects of adiposity on cardiac health of adolescents. These data indicate trends of diminishing ventricular function in youth related to level of obesity; however, overt myocardial dysfunction is rare, and reserve capacity with exercise is generally preserved. Given the marked rise of obesity in youth, an understanding of the pathophysiological implications of these effects early in the lifespan is clearly important. Such information underscores the urgency of preventive efforts and serves to help define specific management strategies [4].

Current study is undertaken to find out the correlation between obesity and associated alterations in cardiovascular functions.

Material and method

Study Design: 80 Students in the age group 18-22 years were randomly selected to obtain mixed group of students from M.G.M. Medical College and were screened to identify the 1)

Non obese group: healthy with BMI<23Kg / $m^2$and 2) Study group (obese): healthy with BMI >23 Kg/m^2.

Method

Inclusion criteria included 1) Students in the age group of 18-22 years. 2) Students who were obese to their respective age and sex were selected. 3) 40 obese students and 40 non-obese students were selected according to the parameters mentioned. Exclusion criteria were 1) The exclusion criteria comprised of students suffering from any medical ailments. 2) Anxious, apprehensive and uncooperative students. 3) Any history of smoking, addiction of tobacco, use of any medications to be excluded from the study. Institutional ethical clearance was obtained. Body mass index was calculated as per the formula:

Body mass index = Weight (Kilograms)/Height (Meter^2).

The students having BMI of more than the cut-off value for their respective age and sex were designated as the test/obese group (both overweight and obese students to be clubbed together). Identical number of age and sex matched non-obese medical students served as controls. Students were explained about the procedures to be undertaken. A brief personal history was taken and written consent was obtained as per Helinski declaration modified according to the test protocol.

1) The subjects were made to rest for 10 min before recording blood pressure as per standard procedure.
2) Orthostatic tolerance test (OTT) The test started with the subject in supine position and blood pressure was recorded. The subject was then asked to stand up immediately and remain motionless and blood pressure was noted at 30 second intervals. Differences between the readings of systolic blood pressure and diastolic blood pressure in lying and immediate standing were calculated. A fall of more than 20 mm Hg in blood pressure was taken as abnormal.
3) Two recordings of blood pressure were taken from which the average blood pressure (systolic or diastolic) was obtained.

Handgrip Dynamometer Test (HGT): The systolic and diastolic blood pressure values were recorded. The subjects were asked to perform Maximal Voluntary Contraction (MVC) by gripping the handgrip dynamometer, as hard as possible for few seconds and the maximum force exerted was noted down. After giving rest for a few minutes, the subjects were made to perform isometric exercise at 30% of the maximal voluntary contraction to the point of fatigue. Systolic and diastolic blood pressure recordings during the period of exercise on other arm. The increase in systolic and diastolic blood pressure during the isometric exercise was calculated and the maximal values of systolic and diastolic BP achieved during exercise were noted down.

Statistical Analysis: Results were analyzed by using Unpaired Student T-test with “P” value < 0.05 for significance.

Results and Discussion

80 subjects (Group A non obese n-40) and (group B obese n-40) that have satisfied the inclusion and exclusion criteria were selected.

Table 1: Comparison of height, weight, B.M.I. in groups

Groups	Height (mean±SD)	Weight (mean±SD)	BMI (mean±SD)
Group A	165.80±9.12	57.98±9.32	20.572+2.391
Group B	163.70±8.81	76.48±10.60	29.00±3.284

Table-1 The two groups for the study were similar in age in terms of basic characteristics. Group A and Group B showed significant difference in Weight and BMI (p<0.001), no significant difference in Height.

Table 2: Comparison of Autonomic function responses in obese and non obese

Parameters	Group A (Non Obese)	Group B (obese)	t-value	P value
Supine Systolic BP	118. 65±7.73	131.30±7.74	7.3117	0.0001 (HS)
Diastolic BP	77.65±4.68	87.10±4.01	9.6932	0.0001 (HS)
Standing Systolic BP	111.00±8.42	120.90±8.33	5.2864	0.0001(HS)
Diastolic BP	75.35±4.72	75.95±4.67	05716	0.5693(NS)
Hand grip Systolic BP	142.030±6.030	150.94±4.980	7.2050	0.0001(HS)
Diastolic BP	86.20±4.16	97.00±3.30	6.4338	0.0001(HS)

Table -2 Shows comparison of Orthostatic tolerance test and handgrip dynamometry as follows:

1. **Group B** subjects showed highly significant increase in systolic BP and diastolic BP (p<0.0001) when compared to Group A in changes from the observed values.
2. **Group B** subjects showed highly significant increase in systolic BP (p<0.0001) and non significant diastolic BP (0.5693) when compared to Group A in changes from the observed values.
3. **Group B** subjects showed highly significant increase in systolic BP and diastolic BP (p<0.001) when compared to Group A in changes from the observed values.

Table 4: Classification of obesity based on measurement of BMI according to WHO [5]

Normal --	18.5-22.9
Average Overweight	-- > 23
At risk --- --Increased	23-24.9
Obese –I – Moderate	---25-29.9
Obese – II Severe	>30

Discussion

Autonomic instability make these obese Subjects prone to hypertension and other cardiovascular disorders later in life. The results of the present study indicate high blood pressure (BP) values prior to orthostatic tolerance test and isometric exercise in the obese group. The high values of BP had a significant positive correlation with BMI. These results of our study are in line with the results of Nahid Khan *et al*. [6] who have observed no significant change in blood pressure levels in obese group as compared to their control counterparts and Guizar *et al*. [7] who have observed change in blood pressure levels in obese group.

For the Isometric exercise, the obese group revealed truncated response as compared to the lean group. Ewing *et al.* [8] have defined a rise of diastolic blood pressure of 15 mmHg or more as normal, 11-15 mmHg as borderline and 10 mmHg or less as abnormal, response to Handgrip dynamometer test. The obese in the present study showed borderline response while the A group children exhibited normal response. During Handgrip dynamometer test, the literature mentions heart rate dependent increase in cardiac output and blood pressure with little change in total peripheral resistance [9]. Thus the responses observed during change in posture and Handgrip dynamometer test have been explained on varied Physiological principles.

Conclusion

There was significant difference in the autonomic parameters (orthostatic tolerance test and hand grip dynamometry) values between obese and lean subjects. This paves the way for implementation of early interventional programs (weight reduction, life style changes, and physical exercises) to prevent the onset of obesity related cardiovascular sequelae in the future by early intervention.

References

1. Irani F, Shinde PU, Heena Kauser GH. Evaluation of autonomic function in obese and non obese medical students’ IJMSPH. 2014; 3(6):142.
2. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public health crisis, common sense cure. Lancet. 2002; 360:473-482.
3. Venkatnarayan KM, Campagna AF, Imperatore G. Type 2 diabetes in children: a problem lurking from India? Indian Pediatr. 2001; 38:17.
4. Gunnar Gudmundsson, Melba Cerveny, Michael Shasby D. Spirometric Values in Obese Individuals, effects of body position. Am. J Respir. Crit. Care Med. 1997; 156(3):998-999.
5. World Health Organization. Obesity; preventing and managing the global epidemic. Geneva: WHO, 1998.
6. Khan N, Ganai J, Kohli S, Muthukrishman S. Evaluation of autonomic function in obese and non obese adolescents. Int. J Clin Exp physiol. 2015; 2:195-8.
7. Guizar JM, Ahuatzin R, Amador N, Sanchez G, Romer G. Heart Autonomic Function in Overweight Adolescents. Indian Pediatr. 2005; 42:464-469.
8. Ewing DJ, Erwing JB, Kerr F, Wildsmith JH, Klarke BF. Cardiovascular responses to sustained handgrip in normal subjects and in patients with diabetes mellitus: a test of autonomic function. Clin Sci. 1974; 46:295.
9. Laird WP, Fixler DE, Huffines FD. Cardiovascular Response to Isometric Exercise in Normal Adolescents. Circulation. 1979; 59(4):651-654.