

Effect of BMI on RBS and Blood Pressure: A Study at Salipur Autonomous College

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Abstract

“*Effect of BMI on RBS and Blood Pressure: A study at Salipur Autonomous College*” was started as a catalysis project. According to current statistics hypertension and diabetes are two major threat to the current human race. After gone through a handful of article and diverse knowledge from different articles and books, I draw to a conclusion about these serious infirmity which can occur at any stage of our life and must develop awareness about these diseases. The cited illnesses are the predominant provoke of various death trapping diseases and also death. High blood pressure or hypertension is a most common worldwide health problem. It is defined as systolic blood pressure level higher than 120 mmHg and diastolic blood pressure 90 mmHg. Increasing in blood pressure resulting various complications like heart disease, renal disease and cerebrovascular accidents etc. Similarly higher Body Mass Index (BMI) is also associated with an amplified risk for heart disease. Excessive increase in body weight leads to obesity. Obesity is the major factor in the pathogenesis of health disorders like high blood pressure and type-2 diabetes mellitus. Association between BMI and blood sugar level has been regularly observed, but remain poorly understood because of associations with other inducing factors. Since BMI is associated with obesity, this study was planned to correlate BMI on RBS (Random Blood Sugar) and Blood pressure.

Keywords: Body Mass Index, type-2 diabetes mellitus, Hypertension, obesity, Random Blood Sugar

1. Introduction

The illness and mortality connected to overweight or obese have been known to the medical field for more than 2000 years (Bray GA Et al., 1997). Now a day’s body weight has become a main problem in developed countries (WHO, 2004). After large number of epidemiologic studies have showed that mortality rises with obesity (Grundy SM et al., 1990). Obese individuals are prone to many cardiovascular risk factors and Lipid metabolism. Increasing Body Mass Index (BMI) directly related to these risk factors (Hubert et al., 1983). Obesity is a major risk issue for the metabolic disorder which itself is a collection of coronary heart disease risk factors (Hubert et al., 1983). It has been demonstrated that individuals with metabolic syndrome are at high risk for successive development of Type 2 diabetes mellitus (T2DM). Severe obesity leads to reduced glucose tolerance in the body (Chan JM et al., 1994). In 1980, according the world Health Organization (WHO) there were 108 million people suffering from diabetes. In adults the occurrence of diabetes is 2-3 folds greater in urban compare to rural population (Singh RB et al., 1995). Obesity is a common co-morbid disorder associated with excessive increase in weight. It is one of the most significant risk factor in the pathogenesis of health complaints such as hypertension and T2DM (E Josiah, 2013).

BMI is a numeral value calculated from a person's weight and height. For adults BMI provide a reliable indicator of body fatness (Nguyen NT et al., 2008). Most people use to monitor for weight categories which may lead to health problems.

2. Review of literature

The people having BMIs of 40+, are over with 53 times risky for type 2 diabetes (Golditz GA et al., 1995). Finding from a health study supported that put on the weight in middle age is a possibility factor for high blood pressure (Huang Z et al., 1998). The development of hypertension in obese persons is chronic and progressive and take years to develop (Shariq OA et al., 2020). It is reported from a study that 2 mmHg difference in blood pressure could account for stroke rate for 15% in adults (Hansson L et al., 1999).

Information from Framingham Heart study by taking the troop of 5,209 women and men denote that the systolic blood pressure raises about an average of 4.5 mmHg for every 10-pound increase in body weight and a decrease of 2.2 pounds in body weight result in to decrease of 0.3 to 1mmHg (Hubert et al., 1983). BMI >25.0 and >30.0 Kg/m² is consider as cut offs for overweight and obesity, respectively (Cole TJ et al., 2000). Paediatric type 2 diabetes has been found very frequently among obese females aged 12 to 14 years (Pulgaron ER et al., 2014). Random Blood Sugar (RBS) increases significantly with increase in BMI status (Chaudhary S et al., 2019).

Currently , from a study nearly 1/3 of all children in Canada and the United states are measured overweight, millions of children at danger of chronic illness, remarkably hypertension (Torrance B et al., 2007).It is seen that those hypertensive patients joining a hospital hypertension clinic having glucose abnormalities (Salmasi AM et al., 2004). Overweight and obese adults were 937 million and 396 million respectively worldwide before 20 years and now figure has almost doubled (Kelly T et al., 2008). Higher BMI in childhood is also related with an increased risk for coronary heart disease in adulthood. With severe obesity, impaired glucose tolerance is highly prevalent in both children and adolescents (Mohammad F et al., 2010).

3. Aims and objective

During literature survey it has been found that, reports on development of hypertension during diabetes are available very much but the dysglycemia during high blood pressure has recently been get interested and still very few reports are available worldwide. Keeping this in mind the present study was planned to find out the relationship between different cardiovascular risk factors such as blood pressure and random blood sugar level according to BMI groups and gender distribution.

Since body weight is associated with BMI, it may be expected that BMI should correlate with blood glucose level.

Therefore, this study has been made for analysis of following parameters.

1. Analysis of relationship between RBS with systolic and diastolic blood pressure in male and female.
2. Study of Relationship of RBS, blood pressure with BMI.

4. Materials and methods

4.1 Study site

A prospective study had been carried out at campus of Salipur Autonomous College by department of Zoology, Salipur, Cuttack, Odisha, India. All teacher staffs and guardians were invited to participate in the study. 141 members were attended in the study, comprising of 93 males and 48 females.

4.2 Inclusion criteria

All members (both male and female) above 25 years.

4.3 Exclusion criteria

Patients suffering from any acute or chronic diseases were excluded. Pregnant women are also not included in the study.

4.4 Methodology

Blood pressure was measured on left arm in sitting position on chair with manual sphygmomanometer. The cuff was wrapped around the upper arm of left hand with the cuff's lower edge one inch above the antecubital fossa. Stethoscope's bell was pressed over the brachial artery just below the cuff's edge. The cuff was then inflated to 180mmHg. Air was released from the cuff slowly. Then the sound was listened with the help of stethoscope and simultaneously observed the dial. The first knocking sound is the subject's systolic pressure and knocking sound when disappears, that is diastolic pressure. The systolic and diastolic pressure was recorded.

Accu-chek is used to measure random blood glucose level. The glucose test strip was inserted in the machine. The subject's finger was pricked with the lancet to draw out a blood drop. The blood drop was carefully touched on to the green field of the test strip. The blood glucose level was recorded.

A single anthropometer is used to measure Height and body weight. BMI was calculated as weight in Kg divided by height in meter squared (Kg/m²). BMI was divided in to four groups as group-1: ≤ 18.5, group-2: 18.6 – 24.9, group- 3: 25 – 29.9, group- 4: ≥30.

For calculation and comparison means of different variables between males and females Xlstat software is used. Different quantitative data was presented in a Tabular form as Mean ± SD.

5. Results

A total of 141 individuals, 93 males and 48 females were examined. Among them 58 were normal weight, 62 are overweight, 7 are underweight and 14 were obese. Comparison of these parameters between males and females, showed that RBS, Systolic and Diastolic BP were significantly higher in males. Overweight individuals had significantly higher level of RBS, Systolic and Diastolic BP than normal weight individuals.

Table - 1

Gender distribution of cardiovascular risk factors (RBS, Systolic and Diastolic BP)

Parameters	Male (n = 93)	Female (n = 48)
BMI	25.13 ± 3.34	25.83 ± 3.58
RBS	155.92 ± 98.59	139.64 ± 64.30
Systolic BP	131.81 ± 13.44	125.85 ± 16.18
Diastolic BP	83.00 ± 8.55	78.64 ± 7.84

Table – 2

Cardiovascular risk factors (RBS, Systolic and Diastolic BP) according to BMI groups

Parameters	BMI Groups			
	Normal weight (n = 58)	Overweight (n = 62)	Underweight (n = 7)	Obese (n = 14)
RBS	124.35± 61.26	181.00±111.04	104.50± 9.50	146.00±32.31
Systolic BP	128.11±12.29	138.50 ± 6.50	131.00±12.00	134.00 ± 3.76
Diastolic BP	82.70 ± 9.99	88.27 ± 7.92	80.00 ± 5.00	87.25±3.76

6. Discussion

Overweight and obesity lead to many complications, including diabetes and hypertension. Most of the landmark studies on these cardiovascular risk factors have been done on western population.

It is expected that as the BMI increase, the frequency of these complications will also increase. In our study differences between BMI groups (normal, Overweight, Underweight and obese); were found for all parameters tested. My results showed that there is a correlation between all the parameters studied in these groups.

From analysis of biochemical metabolism, fatty acids which create body fat content, can be synthesized from simple carbohydrates like glucose. So we can expect increase in blood glucose level can leads to increase in lipid biosynthesis in body and ultimately increase in BMI because of standard formula (weight / square height), BMI proportional to body weight.

It has also been seen that in both male and female groups there is an increase in the systolic as well as diastolic pressure with increase in RBS level in Blood. But we don't get a concrete relationship between BMI and other parameters in both the groups which may be due to less number of samples taken. It may be a fact for a large population.

Overall we can predict that in both males and females there is a strong correlation between RBS and BP, which may reflect the occurrence of some types of cardiac improper working which can be done by extension of this study further.

7. Conclusion

This study reveals that BMI positively reinforce the cardiovascular risk, which is quite hazardous for our life. Food habits, intensive life style and regular exercise may prevent new-onset of diabetes and Blood Pressure, especially in patients with high BMI and high glucose level. This may help in prompt treatment or preventive measures can be taken to avoid future complications.

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