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Original Research Article

TO FIND OUT THE EFFECT OF FAT FREE BODY MASS INDEX AND CENTRAL OBESITY ON BLOOD PRESSURE IN MEDICAL STUDENTS

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Abstract

Background & Methods: The aim of the study is to find out the effect of fat body mass index & central obesity on blood pressure in medical students. Our purpose was to get correlation of blood pressure with body composition so, to avoid circadian variation in the blood pressure recordings, we measured the blood pressure during before lunch period in all the subjects uniformly. In each session of blood pressure recordings, the procedure was demonstrated.

Results: 350 male medical students, 220 students having blood pressure ≤120 mmHg and fat free mass index (FFMI) is in normal range (16.7 to 19.8). The 31 students having blood pressure ≤120 mmHg but their fat free mass index (FFMI) is >19.8. The 72 students having blood pressure >120 mmHg but their fat free mass index (FFMI) is in normal range (16.7 to 19.8) while the 27 students having blood pressure >120 mmHg and fat free mass index (FFMI) is >19.8. 150 female medical students, 90 students having blood pressure ≤120 mmHg and fat free mass index (FFMI) is in normal range (14.6 to 16.8). The 17 students having blood pressure ≤120 mmHg but their fat free mass index (FFMI) is >16.8. The 23 female students having blood pressure >120 mmHg but their fat free mass index (FFMI) is in normal range (14.6 to 16.8) while 10 female students having their blood pressure and fat free mass index both on higher side.

Conclusion: As body mass index increased, waist circumference and systolic blood pressure also increased. Therefore, body mass index as a modifiable risk factor of elevated blood pressure can be the predisposing risk factor for cardiovascular disease in the inactive group of male as well as female students. Since body mass index and waist circumference complement each other, conscious efforts should be made by adults to reduce excessive intake of tobacco, sugar, salt unsaturated fats and oil food.

Keywords: fat, BMI, obesity & blood pressure.
Study Design: Observational Study.

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1. Introduction

Health has been defined in many different ways throughout the History. The ancient Greek Physicians believed that the health to be a condition of perfect body equilibrium [1]. The ancient Chinese believed that health is a reflection of a vital body force called "Qi". In contrast, western medicine attempted to understand the construct of health by analysing its each component rather than the interconnection of the various parts. The western approach has been advocated throughout the world for years, which led the international medical community to focus primarily on disease and disability. Recently medical outlook has begun to change gradually towards a more holistic view [2]. In 1946, The WHO defined health as "a state of complete physical, mental, and social well-being and not merely an absence of disease".

The task in this section is to introduce the concept of blood pressure: high and low pressures [3]. In all parts of the system, blood flow is always from a region of higher pressure to one of lower pressure. The pressure exerted by any fluid is termed hydrostatic pressure.

Blood pressure is defined as the force of blood pushing against the artery walls as blood circulates throughout the body. In the cardiovascular system, this denotes the force exerted by the blood against any unit area of the walls of the blood vessels [4].

Blood must circulate at an appropriate pressure in order to sustain life. Blood pressure rises and falls throughout the day. When blood pressure stays elevated over time, it's called high blood pressure [5].

2. Material and Methods

The present study was carried out in the department of physiology, TNMC and BYL Nair Ch. Hospital, Mumbai on 500 cases for 01 Year. Our purpose was to get correlation of blood pressure with body composition. we measured the blood pressure before lunch period in all the subjects uniformly. In each session of blood pressure recordings, the procedure was demonstrated. The students were given sufficient rest before starting the blood pressure recording. Special information about their exercise schedule was also obtained through the questionnaire regarding type, duration and length of time of exercise.

Inclusion Criteria:

1. Young and healthy medical students.
2. Individuals giving consent for test participation in the study.

Exclusion Criteria:

1. Those suffering from any endocrinal disorders, hypertension and asthma.
2. Individuals not giving consent for test participation.

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3. Result

Table 1: Correlation of fat free body mass index (FFMI) and systolic blood pressure in 350 Male students:

FFMI	Number of males having Systolic blood pressure ≤ 120 mmHg	Number of males having Systolic blood pressure >120 mmHg	P Value
Normal (16.7 to 19.8)	220	72	0.0410
High (> 19.8)	31	27	
Total	251	99	350

The above table shows that out of 350 male medical students, 220 students having blood pressure ≤120 mmHg and fat free mass index (FFMI) is in normal range (16.7 to 19.8). The 31 students having blood pressure ≤120 mmHg but their fat free mass index (FFMI) is >19.8. The 72 students having blood pressure >120 mmHg but their fat free mass index (FFMI) is in normal range (16.7 to 19.8) while the 27 students having blood pressure >120 mmHg and fat free mass index (FFMI) is >19.8.

Table 2: Correlation of fat free body mass index (FFMI) and systolic blood pressure in 150 Female students.

FFMI	Number of Females having Systolic blood pressure ≤ 120 mmHg	Number of Females having Systolic blood pressure >120 mmHg	P Value
Normal (14.6 to 16.8)	90	23	0.2703
High (>16.8)	17	10	
Total	107	33	150

The above table shows that out of 150 female medical students, 90 students having blood pressure ≤120 mmHg and fat free mass index (FFMI) is in normal range (14.6 to 16.8). The 17 students having blood pressure ≤120 mmHg but their fat free mass index (FFMI) is >16.8. The 23 female students having blood pressure >120 mmHg but their fat free mass index (FFMI) is in normal range (14.6 to 16.8) while 10 female students having their blood pressure and fat free mass index both on higher side.

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Table 3: Correlation between waist circumference and Systolic blood pressure in Male Students

Waist Circumference	Number of males having Systolic blood pressure ≤ 120 mmHg	Number of males having Systolic blood pressure >120 mmHg	P Value
≤ 90 cm	228	42	
> 90 cm	50	30	0.0015
Total	278	72	350

Out of 350 male medical students, 228 students having blood pressure ≤120 mmHg and waist circumference ≤90 cm. The 50 students having blood pressure ≤120 mmHg and waist circumference >90 cm. The 42 students having blood pressure >120 mmHg and waist circumference is ≤ 90 cm. 30 students shown both blood pressure and waist circumference on higher side.

Table 4: Correlation between waist circumference and Systolic blood pressure in Female students

Waist Circumference	Number of Females having Systolic blood pressure ≤ 120 mmHg	Number of Females having Systolic blood pressure >120 mmHg	P Value
≤ 80 cm	86	16	
> 80 cm	26	22	0.0119
Total	112	38	150

The above table shows that out of 150 female medical students, 86 students having blood pressure ≤ 120 mmHg and waist circumference ≤80 cm. The 26 students having blood pressure ≤ 120 mmHg and their waist circumference was >80 cm. The 16 students having blood pressure >120 mmHg and waist circumference is ≤ 80 cm. 22 students shown both blood pressure and waist circumference on higher side.

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Table 5: Correlation between Waist-Hip ratio and Systolic Blood Pressure in male students:

Waist Hip Ratio	Number of males having Systolic blood pressure ≤ 120 mmHg	Number of males having Systolic blood pressure >120 mmHg	P Value
≤ 1	238	58	0.0032
> 1	28	26	
Total	266	84	350

The above table shows that out of 350 male medical students, 238 students having blood pressure ≤120 mmHg and waist hip ratio is ≤1. The 28 students having blood pressure ≤120 mmHg and waist hip ratio is >1. The 58 students having blood pressure >120 mmHg and waist hip ratio is ≤1. 26 students have shown both blood pressure and waist hip ratio on higher side

Table 6: Correlation between Waist-Hip ratio and Systolic Blood Pressure in female students:

Waist Hip Ratio	Number of Females having Systolic blood pressure ≤ 120 mmHg	Number of Females having Systolic blood pressure >120 mmHg	P Value
≤ 0.9	86	28	0.7844
> 0.9	26	10	
Total	112	38	150

The above table shows that out of 150 female medical students, 86 students having blood pressure ≤120 mmHg and waist hip ratio is ≤0.9. The 26 students having blood pressure ≤120 mmHg and waist hip ratio is >0.9. The 28 students having blood pressure >120 mmHg and waist hip ratio is ≤0.9 while 10 students have shown both blood pressure and waist hip ratio on higher side.

4. Discussion

In the present study, correlation is observed between waist circumference and Systolic Blood Pressure for the male students with one degree of freedom and the two tailed P value equals 0.0015 which is < 0.05. The association between waist circumference and systolic blood pressure for young male medical students is considered to be strongly statistically significant.

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Why centrally located body fat is more important determinant of blood pressure elevation than peripherally located body fat? [6]. There are three independent but complementary mechanisms: There is increased renal blood flow in obesity, Renin angiotensin system is activated. Surrounding fat and fat infiltrating into medullary sinuses raises intra renal pressure. The intra-abdominal pressure is also elevated in the obese. All these factors together cause altered pressure natriuretic by the kidney and raise the sympathetic tone. This causes arterial blood pressure to rise in obesity [7].

Females in their reproductive years tend to accumulate fat as they age but still retain the gynoid pattern. And in rounding, it is pertinent to note that the absolute working capacity of the active female has been established to be approximately 20% less than that of the active male. Fat being metabolically inactive tissue, has detrimental effect on most sports performances. The primary purpose of cells is to store lipid. Consequently, the greater percentage of fat is detrimental in two ways: the cells do not contribute towards energy production and it costs energy to move the fat. It is a physiological fact that higher body density which is an index of greater quantity of metabolically active tissue, like muscles and bones, favour performance because of the muscular hypertrophy, which serves an adaptive alteration capable of enhancing muscular strength and endurance [8].

Obese individuals with excess intra-abdominal fat are at particular risk of negative health consequences with certain ethnic populations like migrant Indians carrying different levels of risk. Total body fat appears to be a less important indicator of metabolic complications than the fat distribution pattern. Although there is no universally agreed way of measuring central adiposity, Waist Hip Ratio has been found to be the best predictor of cardiovascular disease.

In the present study of relationship between Waist Hip Ratio and Systolic Blood Pressure for female students shows that with one degree of freedom and the two tailed P value equals 0.7844 which is > 0.05, thus the association between waist hip ratio and systolic blood pressure for young female medical students is considered not to be statistically significant [9].

5. Conclusion

As Body Mass Index increased the waist circumference and systolic blood pressure also increased. Hence Body Mass Index as a modifiable risk factor of elevated blood pressure can be the predisposing risk factor for cardiovascular disease in the inactive group of males as well as female students. Since the Body Mass Index and waist circumference complement each other, conscious efforts should be made by adults to reduce excessive intake of tobacco, sugar, salt, unsaturated fat and oily food.

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