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Study the Relationship between Sex, Age, BMI on Blood Pressure and Pulse Rate

			
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ABSTRACT

The prevalence of childhood obesity is a serious public health problem. This problem is a multi-component disease and several factors are involved in its development. The childhood obesity led to poor mastery of fundamental motor skills (FMS) and failure to develop specialized skills that required in organized sports and activities. Thus, the purpose of this study was to examine the relationship between age, sex and body mass index (BMI) with FMS in 3 to 6 years-old children. A total of 600 preschool children (300 boys and 300 girls) between the ages of 3 to 6 years old participated in this research. Subjects were selected through multi-stage cluster random sampling in regions in Tehran. Using the Ohio State University Scale of Intra Gross Motor Assessment (OSU-SIGMA) FMS were assessed. Body mass index (BMI) was directly measured from height (m)²/weight (kg) for each child. The results showed that the negative correlations between jumping, skipping, hopping and throwing skills and BMI in any 3 groups children were significant ($P < 0.05$), but correlations between other FMS and BMI were not significant ($P > 0.05$). The boys were performed better than girls in all FMS except hopping and skipping skills. In these skills, the girls were better performed.

INTRODUCTION

The blood pressure above the normal range 120/80 mm Hg is termed as hypertension. As of 2000, nearly one billion peoples or nearby ~26% of the adult populations of the world had hypertension. It was common in both developed in (333 million) and undeveloped countries (639 million). However, rates vary markedly in different regions with rates as low as 3.4% men and 6.8% women in rural India and as high as 68.9 %men and 72.5% women in Poland. Previously, obesity was considered as a problem of the affluent countries. But nowadays, this problem spreads to developing countries in the world.¹ Various studies have reported that the prevalence of overweight among adolescents varies from 10% to 30%.² Differences in the lifestyle, dietary pattern, and physical activities are the principal contributors of overweight and obesity, responsible for variation in prevalence within the country.² Nearly 50%–80% of obese children continue as obese in adulthood.³ The prevalence of hypertension (HTN) varies from 3.8% to 24.8% in youth with overweight and obesity.⁴

Children with obesity and HTN may be accompanied by additional cardiometabolic risk factors such as dyslipidemia and disordered glucose metabolism,^{5,6} which may contribute their effects on BP or may represent comorbid conditions arising from the same adverse lifestyle behaviours.^{7,8} Some researchers suggested, that the presence of multiple risk factors along with obesity and HTN increases the cardiovascular (CV) risk to great extent than by the individual risk factor alone.⁹

Although this phenomenon has been hard to demonstrate definitively, the strong heart study did show that American-Indian adolescents with multiple cardiometabolic risk factors had a higher prevalence of left ventricular hypertrophy, left atrial dilation and reduced left ventricular systolic and diastolic function compared with those without multiple cardiometabolic risk factors.⁹ With this background, this study was proposed to find the effect of body mass effect on blood pressure (BP) in school going children.

Students of today are the future of the nation and a healthy child is always a supportive hand to nation. Therefore, we the parents are responsible to provide a healthy life to our children and a wealthy nation.

➤ **High blood pressure is classified as:**

- a. Normal blood pressure: less than 120/80 mm Hg.
- b. Prehypertension: 120-139/80-89 mm Hg.
- c. Hypertension: greater than 140/90 mm Hg.
- d. Stage 1 hypertension: 140-159/90-99 mm Hg..
- e. Stage 2 hypertension: 160 or greater / 100mmhg or greater.

MATERIALS AND METHODS

Cross-sectional survey of all the people belonging to Latur city in Maharashtra, for the past 20 years was conducted. A total of 117 males and 123 females aged from 18 to 50 years were included in the present study. Anthropometric measurements including height, weight, circumferences (upper arm, calf), skinfold thicknesses (at triceps, biceps, subscapular, and suprailiac) and physiological dimensions like blood pressure were taken on each subject. A standardized protocol was followed while taking measurements.¹⁰BMI (weight/height²) and fat percentage were calculated. BMI was classified according to the proposed criteria of World Health Organization (WHO) (CED III <16, CED II = 16-16.9, CED I = 17-18.49, underweight < 18.5, normal = 18.5-24.5, overweight = 25.0-29.9, and obese ≥30.00.¹¹ In the present study, all the subjects having BMI ≥30 were taken as obese. Normal blood pressure was taken as < 120 mmHg (SBP) and <80 mmHg (DBP). Blood pressure values of 120-139 mmHg (SBP) and 80-89 mmHg (DBP) were classified as prehypertensive. Stage-I hypertension was taken as 140-159 mmHg (SBP) and 90-99 mmHg (DBP), whereas blood pressure of >160 mmHg (SBP) and >100 mmHg (DBP) were classified as stage II hypertension (JNC2003). Body fat percentage was also computed. Body fat percentage is total body fat expressed as a percentage of total body weight. (Siri's equation). Body fat percentage = $(4.95/D-4.50) \times 100$ where D = Density.

➤ **Statistical analysis:**

SPSS version 16.0 statistical software package was used to carry out statistical analysis. Descriptive statistics of mean and standard deviation, standard error were used to examine the data. Pearson moment correlation was used to find correlation between anthropometric measures and blood pressure. Regression analysis and cross tabulation was also carried out to see relationship between the variables.

The effect of age was controlled statistically to find out the relationship between blood pressure and other variables. Multiple linear regressions were performed to quantify the effect of individual variables to SBP and DBP. SBP and DBP in separate models were the dependent variables; the independent variables were BMI, etc., (categorical), age (continuous).

➤ **Etiology:**

The exact causes of high blood pressure are not known, but several factors and conditions may play a role in its development, including:

- Smoking
- Being overweight or obese
- Lack of physical activity
- Too much salt in the diet
- Too much alcohol consumption (more than 1 to 2 to drink per day)
- Stress
- Older age
- Genetics
- Family history of high blood pressure
- Chronic kidney disease

- Adrenal and thyroid disorders
- Pheochromocytoma (a tumor of the adrenal gland)
- Cushing's syndrome (a hormonal disorder)
- Aldosteronism (a condition in which adrenal gland produce too much of the hormone aldosterone)
- Hyperthyroidism (the thyroid doesn't produce in a hormone)
- Hypothyroidism (the thyroid produces an excess of hormones)
- Coarctation of the aorta (narrowing of the aorta)
- Hyperparathyroidism (excessive productions of parathyroid hormones by the parathyroid glands)
- Acromegaly (A metabolic disorders caused by too much growth hormone)
- Preeclampsia
- Kidney diseases (such as Polycystic kidney disease or glomerulonephritis)
- Sleep apnea
- Certain medicines, such as birth control pills

➤ **Signs and symptoms**

- Headaches
- Nose bleeds
- Blood spots in the eyes
- Facial flushing
- Dizziness
- Severe headaches

- Severe anxiety
- Shortness of breath
- **Risk factor for Hypertension**
- Being overweight
- Having diabetes
- Being of African American Descent
- Eating a lot of salty foods
- Being a male over the age of 45 or a female over the age of 55
- Excessive alcohol consumption.
- A diet high in fat and salt
- Smoking
- Lack of exercise
- Prolonged and poorly managed stress.



➤ **Diagnosis of hypertension:**

Hypertension can diagnosed with devices:

1. Sphygmomanometer
2. Electrocardiogram ECG
3. Echocardiogram

➤ **Management of Hypertension:**

ACE INHIBITORS	Enalapril Lisinopril Perindopril Quinapril Ramipril	Diuretics	Bendrofluazide Hydrochlorothiazide Bumetanide Frusemide Amiloride Spironolactone
ANGIOTENSIN -II ANGIOTENSIN BETA-BLOCKERS	Candesartan Lrbesartan Losartan Valsartan Atenolol Bisoprolol Metoprolol	Alpha- Blocker	Doxazosin Prazosin Terazosin
CALCIUM CHANNEL BLOCKERS (CALCIUM ANTAGONISTS)	Nifedipine Amlodipine Diltiazem Vespamil	Centrally- Acting	Methyldopa Moxonidine

➤ **Pulse Rate:**

Heart rate is the number of times the heartbeats per minute (**BPM**), and the pulse is the beat of the heart that can be felt in any artery that lies close to the skin. The heart beats at different rates depending on whether your body is at rest or at work. When resting the heart rate beats an average of 72 times per minute for higher school students and average of 85 BPM for middle school students. During strenuous physical activity, your heart rates of pulse increases, sometimes twice or more its resting rate. Your stroke volume the amount of blood pump for each Heartbeat also increases this is because muscles that are working demanded more blood to supply them with oxygen and other nutrient.

Heart rate is measured by counting the number of times your heart beats in one minute. One way to determine your heart rate is to manually take your pulse.

The two most common locations used to take a Pulse are at the radial artery in the wrist and the carotid artery in the neck. It is best to practice locating and counting your pulse when you are at rest and again during physical activity.

Abnormalities of Pulse Rate:



❖ Tachycardia

Tachycardia is a resting heart rate more than 100 beats per minute. This number can vary; smaller people and children's have faster rate than average adults.

Physiological conditions when tachycardia occurs are:

- i. Exercise
- ii. Pregnancy
- iii. Emotional conditions such as anxiety or stress

Pathological conditions when tachycardia occurs are

- i. Fever
- ii. Anaemia
- iii. Hypoxia
- iv. Hyperthyroidism
- v. Hypersecretion of catecholamines
- vi. Cardiomyopathy

vii. Valvular heart disease

viii. Acute radiation syndrome

➤ **Bradycardia:**

Bradycardia is defined as the heart rate less than 60 beats per minutes although it is seldom sympathetic until below 50 BPM when human is at total rest. This number can vary children and small adults tends to have faster heart rates than average adults.

Bradycardia may be associated with medical conditions such as hyperthyroidism. Trained athletes tends to have slow resting bradycardia in athletes should not be heart rate and resting bradycardia in athletes not be symptoms associated with it for example Miguel Indurain.

A Spanish cyclist and 5 time Tour de France winner, hard resting heart rate of 28 beats per minute, one of the lowest ever recorded in the healthy.

➤ **Arrhythmia :**

Arrhythmia are abnormalities of the heart rate and rhythm (sometimes field as palpitations permutations). They can be divided into two broad categories fast and slow heart rate some causes few or Minimal symptoms. Others produce more serious symptoms of lightheadedness, dizziness and fainting.

➤ **Body Mass Index :**

Body mass index is defined as the individual's body mass divided by the square of their height. The formula of Universal used to calculate BMI is mass (Kg)/height (m²).

A frequent use of the BMI is to access how much an individual's body weight departs from what is normal or desirable for a person of his or her height. The weight excess or deficiency may, in part be accounted for by body fat (adipose tissue) although other factors such as muscularity also affect BMI help others factors such as significantly (see discussions below and overweight). The WHO regards a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder or other healthy problems while BMI greater than 25 is considered overweight and above 30 is considered obese. These ranges of BMI values are valid only as statistical categories.

Category	BMI Range- kg/m ²
Very severely underweight	Less than 15
Severely underweight	From 15.0 to 16.0
Underweight	From 16.0 to 18.5
Normal (healthy Weight)	From 18.5 to 25
Overweight	From 25 to 30
Obese Class-I (Moderately obese)	From 30 to 35
Obese Class- II(Severely obese)	From 35 to 40
Obese Class-III (Very Severely obese)	Over 40

BMI Range -kg/m ²	Health Risk
27.5 and above	High risk of developing heart disease, High blood pressure, Stroke, Diabetes
23.0 to 27.4	Moderate risk of developing heart disease, High blood pressure, Stroke, Diabetes
18.5 to 22.9	Low Risk (healthy range)
18.4 and above	Risk of developing problems such as nutritional deficiency and osteoporosis

➤ **Health consequences of overweight and obesity in adults:**

The BMI range is based on the relationship between body weight and disease and death.

Overweight and obese individual are at increased risk for many diseases and health conditions including the following:

- Hypertension
- Dyslipidemia (for example high LDL cholesterol, low HDL cholesterol, high levels of triglycerides)
- Type 2 diabetes
- Coronary heart disease
- Stroke
- Gall bladder disease
- Osteoarthritis

- Sleep apnea and respiratory problem
- Some cancers (endometrial cancer, breast cancer, and colon cancer)

➤ **Objective:**

The main objective of this project is to study the relationship between sex, age and BMI on blood pressure, pulse rate in student of Latur College of Pharmacy, Hasegaon data are reviewed with following objectives:

- ❖ To measure the BMI, health conditions blood pressure and Pulse rate of B. Pharmacy student at Latur College of Pharmacy go to college.
- ❖ To correlate the BMI, health conditions blood pressure and Pulse rate in the male and female.
- ❖ To study the effect of age on blood pressure and Pulse rate.
- ❖ To study the effect of BMI on blood pressure and Pulse rate.

➤ **Methodology:**

The data and inputs in the reports incorporate the qualitative information obtained from the students of Latur College of Pharmacy.

➤ **The entire process :**

The next step was to design the entire work. The step is very important in any research. It is on the effectiveness of this step that the ultimate reliability and validity of research finding depends. Since the research used here is non-experimental type of following sources were used to make it effective.

➤ **Analysis of data:**

Three preliminaries should be followed for analysing a data:

- ❖ Collections of data from students.
- ❖ Measure the BMI with help of height and weight.

- ❖ Measure the pulse rate.
- ❖ Measure the blood pressure.
- **Measurement of heart rate:**
- ❖ Set the stethoscope in good conditions.
- ❖ The subject is asked to sit or lie down in the supine position (facing upward).
- ❖ Allow to rest him for 3 minutes.
- ❖ Place the chest piece of the stethoscope against the thoracic wall.
- ❖ Start the stopwatch.
- ❖ Hear the sound and heart through earpiece
- ❖ Count the number of sounds for one Heartbeat is constituted of sounds (Lubb + Dubb)1 minute.
- ❖ Take the three readings
- ❖ Note down the rounded up meaning readings.

➤ **Blood Pressure and Pulse Rate:**

Here blood pressure is measured with the help of digital blood pressure monitor apparatus.

- ❖ An arm cut is wrapped to left arm according to the procedure given manual. Now connect the rubber with tube end of the cuff to the socket which is provided to the left side of the main unit.
- ❖ Now, press on/off button to pressurise the wrapped cuff. The cuff pressure starts increasing and when it reaches in between 160 to 170 mmHg, the pump stop automatically.
- ❖ Remains in quiet and relax positions without body and arm movement. Now the cuff pressure comes down slowly automatically.
- ❖ Symbol appears on the LCD indicating that the measurement start.

❖ Finally notes down reading from monitor, it gives systolic and diastolic blood pressure and Pulse rate.

	Systolic mmHg	Diastolic mmHg
Hypotension	Less than 99	-
Normal	Less than 139	Less than 89
Borderline	140-159	90-94
Hypertension	More than 160	More than 95

➤ **Data And Interpretation:**

Table No. 01: BMI, Health condition, Blood pressure and Pulse rate in City

Number of Students	BMI (Kg/sq mm)		Blood Pressure		Pulse Rate
			Systolic	Diastolic	
110	20.53	Healthy	117.73	74.12	82.39
10	26.34	Overweight	136.1	83.5	91.8
34	17.13	Unhealthy	109.88	70.42	82.97

➤ **Interpretation:**

The finding of research studies shows that 110 students are healthy and 10 students are overweight and 34 students are unhealthy in city.

Table No 02: BMI blood pressure and Pulse rate in City according to sex

Sex	Number of students	BMI (Kg/sq mm)	Blood Pressure		Pulse rate
			Systolic	Diastolic	
Female	42	17.38	111.81	70.38	80.38
Male	112	20.23	119.18	73.70	90.91

➤ **Interpretation:**

The finding of the research studies show that; the female has average BMI 17.38 Kg/sqmm and male average BMI is 20.232 kg/sqmm and blood pressure of female is 111.81/70.38mmhg, while male blood pressure is 119.18/73.70respectively.

Table No. 03: The fate of age on blood pressure and Pulse

Age	Female					Male				
	No of Subjects	BMI (Kg/sqmm)	Systolic	Diastolic	Pulse rate	No of Subjects	BMI (Kg/sqmm)	Systolic	Diastolic	Pulse rate
17	13	20.21	111.24	69.47	92.3	44	20.1	113.9	71.18	80.2
18	03	19.23	104.34	68.67	86	22	17.8	103	65	83
19	04	20.03	113	77.5	87	14	18.4	121.1	71	80
20	04	19.19	109.75	80.25	98.5	09	19.6	118.8	72.33	77.5
21	14	19.66	112.36	76.86	84.3	17	20.4	116	73.82	81.2
22	03	21.86	126	81.67	88	20	21.2	130.9	79.05	82
23	01	19.73	98	67	96	06	23.7	129.5	85.17	89

➤ **Interpretation:**

From the above result conclude that as the age increases the blood pressure increases in both males and females.

➤ **RESULTS AND DISCUSSION**

A survey of 26000 adults in South Indian show hypertension prevalence of 20% (men 23% and women 17%) but 67% of those with hypertension were unaware of their diagnosis. Majority of hypertensive subject still remains undetected and the control of hypertension is also inadequate.

From the review of result, it shows at all healthy and obese ratio is less than student of Latur College of Pharmacy. Hypothesis of etiology of hypertension excessive body weight also major drawback causes of disease. In our research, it also confirms that as BMI i.e ratio of body weight height increases the systolic BP also increase. Risk factors for Hypertension included increases in age, smoking, heavy alcohol use, family history, obesity, physical inactivity, and moderate salt intake.

Table 1 shows the finding of research studies show that 110 students are healthy and 10 students are overweight and 34 students are unhealthy in city. Table 2 shows the finding of the research studies show that; the female has average BMI 17.38 Kg/sqmm and male

average BMI is 20.232 kg/sqmm and blood pressure of female is it 111.81/7.38 mm Hg, while male blood pressure is 119.18/73.70 respectively. Table 3 shows from the above result conclude that as the age increases the blood pressure increases in both males and females. Frequency distribution of students in different group of weight status. Nearly 20% boys and 17.14% girls were overweight, respectively; overall overweight, among all students, was 18.79%. Similarly, 23.88% boys and 11.42% girls were obese respectively; overall obesity among all students was 18.62%. This data suggested that the prevalence of overweight and obesity is more in boys than girls in this study. In boys, HTN prevalence was 7.84% whereas in girls 4.47% and among all overweight and obese students it was 6.45%. Table 8 shows the association between overweight obesity and HTN. Odds ratio 8.27 suggested that was associated with overweight and obesity students at significant level.

CONCLUSION

The hypertension shall be prevent and manage the following changes in the Lifestyle modifications to hypertension.

- ❖ Maintain normal body weight (body-mass index of 18.5 to 24.9).
- ❖ Consume diet is rich fruits, vegetables, and low fat dairy products, with little saturated and total fat.
- ❖ Reduce dietary sodium intake to know more than 2.4 grams of sodium or 6 grams of sodium chloride (6 gm of sodium equals about 1 teaspoon of table salt sodium chloride).
- ❖ Engage in regular aerobic physical activity, such as a brick walking at least 30 minutes per day on most days of the week.
- ❖ Limit consumptions to no more than two drinks per day (1 ounce or 30 ml ethanol [e.g 24 ounces of beer, and 10 ounces of wines, or 3 ounces of proof whiskey) for most men and no more than one drink per day for women and lighter weight persons.

LIMITATIONS

- ❖ For the evaluation of prevalence, a larger group of students is more appropriate. Socioeconomic status of the parents is lacking here which is a contributing factor of

overweight and obesity. Dietary habit of the students may be considered for overweight and obesity. Further study may be done considering all these aspects for a better output.

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