Correlation of BMI with age and blood pressure in Medical and Pharmacy female students of Karachi, Pakistan.

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ABSTRACT:
The study is designed to assess the prevalence of abnormalities in weight and blood pressure in educated females enrolled in professional degree programs of Pharm.D and M.B.B.S. BMI score less than 18.5 (underweight) is more frequently reported in students of age 20 (9.8%) and 21 (10.9%) years. Obesity is also reported more frequently in students of age 20 (0.70%) as compared to other age group. BMI score less than 18.5 (underweight) is seen in 39.8% female students within age group (16-32), whereas 3.90% students are overweight with a BMI score of 25-29.9. Obesity is reported in 2% students. There is no significant correlation between BMI and age within the age bracket 16-32 (p = 0.168). Although most of the students were normotensive, low systolic B.P was reported in 31.73% and low diastolic B.P was noted in 26.73 students. Prehypertension was assessed in few students (systolic 19.3% /diastolic 10.8%). Low blood pressure associated with BMI abnormalities are predisposing risk factors assessed in female students of child bearing age.

KEYWORDS: BMI, Females, Students, medical, Blood pressure

INTRODUCTION:
Body mass index is considered as a common health measure of weight relative to height. It is directly linked with the health and physical fitness of subjects. Individuals can be categorized as underweight, normal, overweight and obese based on the BMI score. The general formula used to calculate BMI is given below.

\[
BMI = \frac{Weight \ in \ kg}{Height \ in \ meters^2}
\]

BMI is associated with physical and psychological health, quality of life and mortality. Individuals having low body weight and low BMI are extremely prone to fracture of bones. Low BMIs (underweight category) are associated with certain types risks like if the BMI is =17 then the physical activity of individuals would be affected. The emotional condition, feeling of self-esteem and the body image distortion is linked with the underweight young women.

Overweight and obesity are the leading causes of high Blood Pressure, cardiovascular disease, ischemic stroke, osteoarthritis, type II diabetes mellitus, low level of vitamin D, and certain types of cancers. Hypertension is a growing issue in developing countries. BMI plays an important role in development of hypertension, high blood cholesterol, and abnormal lipids. It is estimated that about 58% of diabetes mellitus and 21% of ischemic heart disease are attributable to BMI score above 21. A positive correlation of BMI with hypertension is reported in Caucasian populations. It is also reported that risks of mortality due to cardiovascular disorders is related to BMI abnormalities e.g. very lean or obese.

Now a day’s developing countries are currently investigating the association between BMI and hypertension especially in Asian population, since it is clearly understood these populations have ability to develop chronic diseases compared to other races like whites, Hispanics, blacks, and Polynesians. The possible causes for racial differences are higher body fats, their life styles, genotype, and cultural differences etc. Tuan et al (2009), recommended that country-specific, sex-, and age-specific BMI cutoffs should be determined to reduce health and economic burdens of both overweight and chronic diseases. The study
is designed to determine the relationship between age and hypertension with BMI in young women students of medical university of two private sector universities.

METHODS:
The study comprising of three stages was conducted in two private sector universities of Karachi on female students enrolled in 5 years Pharm. D and M.B.B.S degree programs from June 2012- April 2013. In the first stage, in-house seminar was conducted for the students at each campus to deliver appropriate knowledge regarding BMI, hypertension and weight management. The students attending the seminar were invited to register in a research project designed to assess the correlation of BMI with age and blood pressure in young female students pursuing a professional degree in health care sector after institutional approval. Student registration process on volunteer basis, following informed consent was initiated in the second stage of the study. 321 Pharm. D and 283 Medical students were initially enrolled. 230 students from each group were selected to be included in the study by convenient sampling method.

Age group selected for the study was 16-32 years, whereas majority of these students were in the age bracket 19-23 years (Figure 2). In the third and final stage, age, height and weight of the student were noted to calculate the BMI using standard formula

According to WHO, the desirable BMI cutoffs in Asians is 18.5-22.9. BMI score of less than 18.5 was considered underweight, score 18.5-24.9 considered normal, score 25-29.9 considered overweight and score above 30 considered obese. Weight was measured on mechanical scale, beurer MS01® (loading capacity 120 kg /260 lb & robust mechanism). Blood pressure was measured using a mercury sphygmomanometer. The first reading was recorded after the student was seated in a relaxed manner on a comfortable chair with back support and arms supported at heart level. The second and third reading was noted for the same student after a period of five and fifteen minutes. If the difference between any two subsequent readings was more than 5mm Hg, a fourth reading was taken. The finalized B.P measurement for each student was the average value calculated from the individualized readings for each student. The criterion adopted for classification of students in the groups of hypotensive, normotensive and hypertensive is shown in Table 1. Data was analyzed on SPSS version 16.0, and the correlation between age and BMI was assessed by Pearson correlation test.

RESULTS:
The distribution of students within each class of Hypertension based on systolic and diastolic blood pressure measurements is shown in Table 1. Although frequency of Normotensive students is more, blood pressure abnormalities are observed in approximately 50% students. The most frequently reported abnormality in blood pressure is hypotension (31.73% systolic / 26.73% diastolic) which is assessed in the female students.

Figure 1 shows the averages of BMI score in the students of same age e.g. 16, 18, 21 years etc. Figure 2 shows the interpretative BMI score (e.g. obese, underweight etc.) with respect to age of the respondents. Figure 3 shows the percentage frequency of underweight, normal, overweight and obese students correlated with particular ages. The value of Correlation coefficient is 0.168, which shows that there is a positive weak correlation between BMI and AGE.
Table: Percentage distribution of students W.R.T Blood Pressure ranges

<table>
<thead>
<tr>
<th>Counts</th>
<th>Percentage</th>
<th>Blood Pressure – Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>146</td>
<td>31.73</td>
<td>Systolic Hypotension - Less than 100 mm Hg</td>
</tr>
<tr>
<td>221</td>
<td>48.04</td>
<td>Systolic Normal – 100-120 mm Hg</td>
</tr>
<tr>
<td>88</td>
<td>19.13</td>
<td>Systolic Prehypertension - 120 - 139 mm Hg</td>
</tr>
<tr>
<td>3</td>
<td>0.65</td>
<td>Systolic Hypertension Stage 1 - 140 - 159 mm Hg</td>
</tr>
<tr>
<td>2</td>
<td>0.43</td>
<td>Systolic Hypertension Stage 2 - 160 mm Hg or higher</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Systolic Hypertensive Crisis - Higher than 180 mm Hg</td>
</tr>
</tbody>
</table>

**DIASTOLIC BLOOD PRESSURE**

<table>
<thead>
<tr>
<th>Counts</th>
<th>Percentage</th>
<th>Blood Pressure – Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>26.73</td>
<td>Diastolic Hypotension- less than 70 mm Hg</td>
</tr>
<tr>
<td>284</td>
<td>61.73</td>
<td>Diastolic Normal – 70- 80 mm Hg</td>
</tr>
<tr>
<td>50</td>
<td>10.87</td>
<td>Diastolic Prehypertension - 80 - 89 mm Hg</td>
</tr>
<tr>
<td>3</td>
<td>0.65</td>
<td>Diastolic Hypertension Stage 1 - 90 - 99 mm Hg</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Diastolic Hypertension Stage 2 - 100 mm Hg or higher</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Diastolic Hypertensive Crisis - Higher than 110 mm Hg</td>
</tr>
</tbody>
</table>

Figure: Averages of BMI respective to age distribution
Figure 1: Percentage Frequency of underweight, normal, overweight and obese students W.R.T age
**DISCUSSION:**
We came across several cases of blood pressure abnormalities assessed in the students. The most frequently reported abnormality was low blood pressure. Hypotension in females is associated with chronic fatigue response, which eventually interferes with the performance status. Persistent hypotension often results in intracranial hypotension which is more common in women as compared to men leading to a host of complications during pregnancy. In our study hypotension was more frequently assessed in underweight students. Most of these students were aware of their persistent low blood pressure condition and did not feel the need to acquire medical consultancy as they treated the matter to be trivial. A common myth among the medical students was that, since pregnancy is often a cause of secondary hypertension, being hypotensive is not a drawback. On the contrary, chronic maternal hypotension in pregnancy is associated with earlier deliveries, low birth weight and postpartum complications. Chronic hypotension is also considered to be a risk factor of occlusive cerebrovascular disease. Hypotension is more frequently reported in underweight young females. Although high blood pressure was assessed in only few students, high blood pressure at such a young age is a matter of concern and requires appropriate treatment. It is also important to assess the etiological aspects associated with high blood pressure in young females. None of the participants of the study were treated with antihypertensive agents at the time of the study. Maximum data generated in our study comprised of age 19-23 years. 12.40% students were of 19 years of age and 7.40% of them had a low BMI score thus placing them in the category of 'underweight'. 25.70% of the respondents were of age 20 years and 9.8% of them were underweight, similarly 23.9% of students were of age 21 and 10.9% of them were underweight. 18.7% of students were of age 22 and 6.30% of them were underweight. According to our data more than 5% students within age group 19-22 were underweight. Students of age 24-32 years had BMI score more than 18.5. We observed that students in first, second and third year of Pharm.D and M.B.B.S degree programs have a tendency to be underweight. Obesity was negligible in the students. Obesity was comparatively more frequently reported in students of age 25 (0.4%). 54.30% of the students enrolled in the study had an optimal BMI score of 18.5-24.9. These were healthy girls with normal BMI and good performance status. A few of them expressed dissatisfaction with their
physical appearances and wanted to lose weight despite having a desirable BMI score within 19-25. This obsession to grow more and more thinner, identified in few young girls is associated with many perils manifested later in their lives. It is largely required to generate appropriate awareness in this regard to prevent self-inflicted hunger and low self esteem in such cases. Most of our female population develops vitamin D deficiency, depleted bone mineral density and many other associated pains or disability after childbirth or menopause. A critical in line investigation to correlate low BMI score in women with disorders apparent in later stages of life might help in bringing forth associated facts and prove out theory.

CONCLUSION:
Blood pressure abnormalities associated with high and low BMI scores is evaluated in approximately 50% of young girls. Hypotension was more prevalent than hypertension. BMI score less than 25 was assessed in 94.1% respondents. Obesity was negligible in the medical and pharmacy female students.

REFERENCES:
4. Durnin JVGA. Low body mass index, physical work capacity and physical activity levels. Eur J Clin Nutr, 1994, 48(Suppl.3), S39–S44.
15. MacMahon S, Cutler J, Brittain E, Higgins M. Obesity and hypertension: epidemiological and clinical issues. Eur Heart J, 1987, 8(Suppl B), 57-


20. NT, LS, CM, K, BM. The association between body mass index and hypertension is different between East and Southeast Asians. Am J Clin Nutr, 2009, 89(6), 1905-1912.


