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Original article

Study of obesity and hypertension among 1st year MBBS students admitted to Rural Medical College, Loni, Maharashtra

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ABSTRACT

Background: Hypertension is a chronic condition of concern due to its role in the causation of coronary heart disease, stroke & other vascular conditions & obesity is among one of the many modifiable risk factors for hypertension.

The objective of our study was to find out the proportion of hypertension & obesity with or without first degree relatives affected by diabetes mellitus(DM) or hypertension(HTN) or both among 1st year MBBS students in the age group of 20±2 years.

Materials & Methods: A descriptive cross-sectional study was carried out among 200 1st year MBBS students from September 2018- February 2019 at Rural Medical College, Loni, to know about their weight, blood pressure, height etc., via a questionnaire prepared for this purpose. Taking prevalence of obesity~39.5%(=20.6% for women+18.9% for men) among Indians according to NFHS 4 data[3] the sample size was calculated as ~170.

Questionnaires were distributed among those who were willing to participate and their blood pressure, weight, height, WC & WHR were measured & recorded & all 200 total students admitted in 1st year all participated in the study.

BMI was classified according to WHO 2003 classification & hypertension was classified according to JNC7 classification.

Results: Of the 200 students who participated 105 students were girls & 95 students were boys.

After proper analysis of the data collected, it came into view that 36.84% of the boys & 40% of the girls had BMI ≥25.

44% of the boys & 48% of the girls were detected with pre-HTN.

Conclusion: The proportion of both males & females who were found to be overweight(BMI≥25) was much higher when compared with the values given according to NFHS-4.

Key words:- HTN, BMI, WHR & first degree relative family history of DM/HTN/both.

INTRODUCTION:-

Hypertension is a chronic condition of concern due to its role in the causation of, coronary heart disease, stroke & other vascular conditions(like PVD)[1]. Hypertensive heart disease is the No.1 cause of death associated with high blood pressure.[2] Obesity is among one of the many modifiable risk factors for hypertension.[1] This study was conducted to find the proportion of hypertension & obesity with or without first degree relatives affected by diabetes or hypertension or both among 1st year MBBS students in the age group of 20±2 years. According to the NFHS 4[3] data men & women in the age group of 15-49 years, who were found to be overweight (i.e., BMI≥25.0Kg/m²) were 18.9% & 20.6% respectively which was found to be much

higher compared to NFHS 3 data. According to the same NFHS 4 data [3] men & women in the age group of 15-49 years, with slightly above normal systolic 140-159mm of Hg and/or diastolic 90-99mm of Hg, were found to be 10.4% & 6.7% respectively. The aim of the study was to find the prevalence of obesity & hypertension among 1st year MBBS students admitted to Rural Medical College, Loni, Maharashtra. The objective of the study was to find out the proportion of hypertension & obesity with or without first degree relatives affected by diabetes or hypertension or both among 1st year MBBS students in the age group of 20±2 years.

MATERIALS & METHODS

A descriptive cross sectional study was conducted among all the 200 first year MBBS students, among whom 105 were girls & 95 were boys, who were admitted to Rural Medical College, Loni, Maharashtra for the year 2018-19 to find the proportion of hypertension & obesity with or without first degree relatives affected by diabetes or hypertension or both. The study was conducted from September 2018- February 2019. Every Saturday 20 students according to their roll numbers were called for in a separate room where along with their BP, weight & height their waist & hip circumference were also taken. A questionnaire was prepared for this purpose & was distributed among the participants to be filled by them. This questionnaire allowed us to know about their family history among their first degree relatives for the presence of DM/HTN or both. For maintaining privacy of the students all the measurements for a female student was taken by me & the female intern who was posted in our department & consecutively for the male students the measurements were taken by the male intern posted in the department of community medicine. The study was conducted only after IEC gave approval for it. Informed verbal consent was also taken from all the participants about their willingness to participate. The analysis of data was done by using Chi-square with p-value. Calculations were done using GraphPad(2018 GraphPad software), MS Office Excel 2007 version & OpenEpi(2006 version). p-value < 0.05 was considered to be statistically significant. The sample size was calculated using the formula $4pq \div L^2$, where, p=39.5%(prevalence of obesity in India according to NFHS 4 data [3]), q=(100% - 39.5%)=60.5% & L= 19% x 39.5%=7.505% (taking permissible error at 19%), the sample size was calculated to be 169.7~170. Taking prevalence of HTN at 17.1% (prevalence of HTN in India according to NFHS 4 data [3]) using the same formula the sample size was calculated as 537. But since only 200 students were admitted in 1st year in this college, for sample size we had chosen the prevalence of obesity. For this study we had included all the 200 first year MBBS students who were admitted. Weight of the participants were measured using mechanical bathroom weighing scale was by Sknol, model number 747, with an accuracy at 0.5kg. The minimum & maximum weight that could be taken was 5kgs & 150kgs respectively. For the measurement of the height of the participants standiometer was used. The participant was asked to stand upright & was told to look straight at front. The head was kept fixed & the participant was told to take off the shoes on standing on the platform of the standiometer. The measurements were taken in centimeters. Digital blood pressure monitor by Diamond model number BPDG 124, with cuff size of 14.5cm x 48cm & accuracy of ±3mm of Hg was used for the measurement of blood pressure of the participants. Only one reading was taken for all the participants after they had entered the room & after taking rest for 5 minutes. The measurement was taken in sitting upright position & placing the elbow on a table in front of the student so that the arm cuff can be placed at the same level as that of the heart. For measurement of the waist circumference of the participants, a tailor tape was used. It was taken in standing position. The tape was placed on the mid-way between lower rib & iliac crest just above the hipbones.

The tape was placed horizontally around the waist. It was made sure that the tape was not compressing the skin & measurement was taken just after the participant had breathe out, in centimeters. For the measurement of the hip circumference of the participants also a tailor tape was used. It was measured at the level of the widest circumference over the great trochanters, in centimeters.

Criteria used for defining BP, BMI & WHR

1) BP:- JNC 7 classification was used for this purpose.[1]

- ✓ BP Scheme for Adults (in mm Hg)
  - Normal: SBP <120 and DBP <80
  - Pre-hypertension: SBP 120-139 or DBP 80-89
  - Stage 1 hypertension: SBP 140-159 or DBP 90-99
  - Stage 2 hypertension: SBP ≥160 or DBP ≥100

2) BMI=weight in kg÷ height in metre^2

Table No. 1:- Classification of obesity according to BMI[1]

Classification	BMI (in kg/m^2)	Risk of co-morbidities
Underweight	< 18.50	Low (but risk of other clinical problems might increase)
Normal range	18.50-24.99	Average
Overweight :-	≥2 5.00	
a) Pre-obese	25.00-29.00	Increased
b) Obese class 1	30.00-34.99	Moderate
c) Obese class 2	35.00-39.99	Severe
d) Obese class 3	≥40.00	Very severe
Adapted from WHO, 2003.		

3) WHR:- Classification of obesity according to waist hip ratio(WHR)[1]

WHR>1 for males & WHR>0.85 for females.

RESULTS

I) For weight distribution

After proper calculation among the total 105 female participants, 9(=9%) were found to be underweight among whom 4(44.44%) had a positive family history, 54(=51%) had BMI within normal range of whom 17(=31.48%)had a positive family history, 35(=33%) were pre-obese of whom 17(=48.57%) had a positive family history, 6(=6%) had class 1 obesity of whom 2(=33.33%) had a positive family history & 1(=1%) had class 2 obesity with no positive family history. After proper calculation, among the 95 male participants 4(=4%) were found to be underweight of whom none had a positive family history, 55(=58%) had BMI within normal range of whom 12(=21.82%) had a positive family history, 26(=27%) were found to be pre-obese of whom 9(=34.61%)had a positive family history, 8(=9%) had class 1 obesity of whom 4(=50%)had a positive family history, 1(=1%) had class 2 obesity of with no positive family history & 1(=1%) had class 3 obesity with no positive family history. A total of 39% of the participants were found to be overweight among whom 37.89% were males whom 36.11% had a positive family history & 40% were females of whom 45.23% had a positive family history. The statistical association of obesity with a positive fist degree family history of either DM/HTN/both was found to be positive(p=0.0381), as shown in table no.2. Using Brocca index as calculator for obesity it was found that 51.58% of males & 53.33% of females were overweight. Using WHR as calculator for obesity it was found that 0% of males & 44.76% of females were overweight.

II) For distribution of blood pressure

After proper calculation among 105 female participants it was found that, 24(=23%) were

normotensive among whom 7(=29.17%)had a positive family history, 51(=48%) were pre-HTN among whom 18(=35.29%)had a positive family history, 24(=23%) had Stage 1 HTN among whom 11(=45.83%)had a positive family history & 6(=6%) had Stage 2 HTN among whom 4(=66.66%)had a positive family history. After proper calculation among 95 male participants it was found that, 17(=18%) were normotensive of whom 2(=11.76%) had a positive family history, 42(=44%) were pre-HTN among whom 11(=26.19%) had a positive family history, 31(=33%) had Stage 1 HTN among whom 10(=32.26%) had a positive family history & 5(=5%) had Stage 2 HTN among whom 2(=40%)had a positive family history. 46% of participants were found to be pre-hypertensives of whom 44% were males & 48% were females. 33% of the participants were hypertensives of whom 37.8% were males & 28.57% were females. So a total of 33% of the participants were found to be hypertensives among whom 37.89% were males of whom 33.33% had a positive family history & 28.57% were females of whom 50% had a positive family history. No statistical association was found to exist between high blood pressure & positive fist degree family history of either DM/HTN/both(p=0.92) as shown in table no.3.

III) Participants who were both obese & hypertensives

After proper calculation it was found that, 34% of the participants were both overweight & hypertensive of whom 34.74% were males of whom 36.36% had a positive family history & 33.33% were females of whom 48.57% had a positive family history. The statistical association of both obesity & high blood pressure with a positive fist degree family history of either DM/HTN/both was found to be positive(p=0.02), as shown in table no.4.

IV) Participants who had BMI within normal range & who were normotensive

After proper calculation it was found that,15.5% of participants were neither overweight nor hypertensive among whom 14.74% were males of whom 7.14% had a positive family history & 16.19% were females of whom 29.41% had a positive family history.

Association of BMI with family history

Table No. 2:-BMI & family history			
Family history	**Overweight**	**Normal range**	**Total**
Positive	32	29	61
Negative	46	80	126
Total	78	109	187
Chi-square=4.301; p-value=0.0381; df=1 Association was found to be statistically significant.			

Association of blood pressure with family history

Table No. 3:- Blood pressure & family history			
Family history	**Hypertensive**	**Normotensive**	**Total**
Positive	15	9	24
Negative	51	32	83
Total	66	41	107
Chi-square=0.009 ***p-value=0.92*** **df=1** ***Association was found to be not significant statistically.***			

Table No. 4:- Association of both obesity & HTN with family history

Family History	Obesity with hypertension		
	Present	**Absent**	**Total**
Positive	29	6	35
Negative	39	25	64
Total	68	31	99
Chi-square=5.05 ***p-value=0.02*** **df=1** ***Association was found to be statistically significant.***			

DISCUSSIONS

The present study had found that obesity by itself & obesity with HTN was found to be statistically significant with a positive family

history of DM/HTN/both among first degree relatives. 39% of the participants were found to be overweight among whom 37.89% were males & 40% were female participants. Chaudhury AR [4] found 26.66% participants to be overweight, 25.79% of the participants were overweight was found by Sengupta P[22] & Parsekar S[13] had found only 9.18% of the participants to be overweight. Mehta DP[20] had found 11.53% of the participants to be overweight among whom 7.69% were boys & 3.84% were girls. Sharma S[24] had found 11.5% of males & 4.12% of female participants to be overweight. Fernandez K[23] in his study had found 10.75% of male participants & 16.6% of female participants to be overweight. A study carried out by Akhuemonkhan E[7]had found that participants with family history of DM/CVD/both were more likely to be overweight/obese similar to the present study. The present study had found a much higher prevalence of obesity & the prevalence was found to be higher in females compared to males.

HTN was not found to be statistically significant, in the present study, with the presence of a positive first degree relative family history of DM/HTN/both whereas the statistical significance of HTN with obesity was found to be positive. After proper analysis 46% of the participants were found to be pre-hypertensives, in this present study, of whom 44% were males & 48% were females. The prevalence of hypertension in the present study was found to be 33% among whom 37.8% were males & 28.57% were females. Chaudhury AR[4] had found a much lower prevalence of pre-HTN & HTN of 17.26% & 8.24% respectively among the participants. Similar lower prevalence of pre-HTN & HTN of 41.5% & 18.9% respectively was found among the participants in a study conducted by Tripathy J [5]. Ramanathan AS[9] had found a prevalence of only 3.8% & 9.6% of boys & girls respectively for HTN. Similar lower prevalence of both pre-HTN & HTN were found in the studies carried out by Das P[14]& Parsekar S[13]. A study carried out by Agwu EM[12], had found less than 10% of the participants to be hypertensives. A study carried out by Srivastava AK[19] had found the prevalence of pre-HTN to be 45.9% among males & 69.2% among females much higher compared to the pre-HTN prevalence as found in the present study, whereas the prevalence of HTN was found to be much lower when compared with the present study. In a similar study carried out by Chockalingam A[15], among young adults had found that 46.6% of males & 49.8% of females to be pre-hypertensives & 36.2% of males & 30% of females to be hypertensives & the study findings were found to be very similar when compared with the present study.

The high percentage of obesity & HTN in my study compared to most of the studies may be because of the following reasons:- 1.Less amount of physical activity because of NEET preparation. 2. Higher socio-economic status of the participants & 3.Positive family history among first degree relatives.

RECOMMENDATIONS

Physical activities like brisk walking, swimming, cycling was advised to the participants whenever the little time they can manage from their busy schedule. They were told to practice Yoga & Meditation mostly in the morning mainly before coming for the college. Advice was also given to all of them & they were told to follow DASH diet. It takes time to give up on addiction completely so the students were asked to restrict oneself as much as possible from smoking tobacco & drinking alcohol. Students with obesity stages 1,2 & 3 & with HTN stage 1 & 2 were asked to have medicine consultation done. It was also recommended to the physiology department who will be conducting the same study on the same population to have the BP checked both by digital BP machine & also by manual sphygmomanometer.

STUDY LIMITATIONS

According to WHO, blood pressure should be recorded thrice, but here the blood pressure of the students was recorded only once as the time limit was short & being in first year the students had a fixed schedule for everything. It was only a pilot study with further studies to be done in their 2nd year of PSM posting. Study finding cannot be extrapolated to general population.

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