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Study of Body Mass Index and Hypertensive Status in Adult Males between 40-60 Years.

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ABSTRACT

This study aims to study the association of body mass index (BMI), blood pressure and age in adult males between 40-60 years. Body Mass Index, Systolic BP/Diastolic BP/Mean Arterial /Pulse Pressure were measured on 60 male patients aged between 40-60 years. Statistical comparisons and correlations were carried out between 40-50 year age group and 50-60 year age groups at 5% level of significance. In the Age group between 40-50 years (n = 33), 14 were non-obese & normotensive (43%), 10 were Obese & normotensive (30%) & remaining 9 were Obese & Hypertensive (27%). In the Age group between 50-60 years (n = 27), 6 were non-obese & normotensive (22%), 10 were obese & normotensive (37%) & remaining 11 were obese & hypertensive (41%). SBP, DBP, MAP & PP are high in 50-60 year age groups. MAP correlated positively with BMI in both age groups. Identification of percentage of population at risk among middle aged males between 40-60 years will benefit for therapeutic & prophylactic measures to prevent obesity related morbidity & mortality.

INTRODUCTION

Obesity has been shown to be associated with risk factors for cardiovascular diseases, hypertension, diabetes, gallstones and orthopaedic impairments. Globally, high blood pressure is estimated to cause 7.1 million deaths, about 13% of the total. About 62% of cerebrovascular disease and 49% of ischaemic heart disease are attributable to suboptimal BP (systolic > 115 mm Hg). Overweight and obesity increase the risks of high BP, coronary heart disease, ischaemic stroke, type II diabetes mellitus, and certain cancers. In the age group 40-60 years the prevalence of grade II obesity (BMI >30) has been estimated at between 15 and 25% among males. Several studies indicate that high BP is associated with age and is a result of rapid economic development and modernization with changing lifestyle factors has an increasing trend of hypertension, especially among the urban population in South-East Asian countries including India [1,2].

The analysis of the relation between body mass index and hypertension could be informative regarding the occurrence of hypertension in middle aged males so as to suggest preventive measures against the future risk for cardiovascular diseases, metabolic syndrome and other obesity related disorders. This study aims to study the association of body mass index (BMI), blood pressure and age in adult males between 40-60 years.

MATERIALS AND METHODS

This PILOT STUDY was conducted on 60 male patients aged between 40-60 years selected by systemic random sampling method. The subjects were divided into two different age groups with ten years interval each (40-50 years & 50-60 years) to study the age trend of BMI and BP. Females and Subjects with diabetes mellitus, liver disorders, cardiac diseases, kidney diseases, smoking, alcoholism, other endocrinal disorders, bronchial asthma, acute or chronic inflammatory diseases, autoimmune diseases and on other medications like steroids, antipsychotic drugs were excluded from the study. The information was collected about various socioeconomic

factors, family history, addiction, exercise, associated disorders, life style etc. on preformed, pre tested interview schedule by investigator himself. The following anthropometric parameters were recorded for the study group – Height (mtr), Weight (Kg) & BMI (body weight in Kg/height in m^2) using standard protocols given by Weiner and Lourie [3]. Stature was measured by anthropometer to nearest 0.1 cm and weight was measured using portable spring weighing machine with least count of 0.5 kg, in light clothing and without shoes. Body mass index (BMI) is calculated as the weight in kilograms divided by the square of the height in meters (kg/m^2). A BMI below 20 is considered as underweight and between 20 and 24.9 as desirable. From 25 on three categories of being overweight are distinguished: 25 - <30 = grade I obesity, 30 - <40 = grade II obesity and >40 = grade III or morbid obesity [4].

Blood pressure was measured with a mercury sphygmomanometer using the appropriate sized cuff. Blood pressure was categorized according to JNC-7 [5]. Normal blood pressure was defined as a systolic blood pressure (SBP) <120 mmHg and a diastolic blood pressure (DBP) <80 mmHg. Subjects taking anti-hypertensive treatment were considered to have definite hypertension regardless of their measured blood pressure, The subject was asked to sit relaxed in a chair with her/his arm supported comfortably and care was taken that arm muscles were relaxed and the forearm was supported with the cubital fossa at heart level (4th intercostal space). The cuff was applied evenly to the upper arm. The cuff was rapidly inflated to pressure above the level at which the radial pulse could no longer be felt. The stethoscope was placed lightly over the brachial artery and the mercury column was immediately allowed to fall at the rate of 2 mmHg per second. The first perception of the sound was taken as the Systolic Blood Pressure (SBP) and then the mercury was allowed to fall further till the sound ceased to be tapping in quality, became fully muffled, and finally disappeared. The level where it disappeared was taken as the Diastolic Blood Pressure (DBP). The cuff was then deflated to zero pressure. The measurement was repeated twice with five-minute interval and the average taken for accuracy. Mean Arterial Pressure (MAP) was calculated by the formula: MAP = (2/3 × DBP) + (1/3 × SBP). Pulse Pressure (PP) was calculated by the formula: arterial PP (PP = SBP – DBP) [6].

Statistical Analysis

Values were expressed as Mean ± SD. Statistical comparisons were carried out by Student't' test & Pearson's correlation coefficients were derived at 5% level of significance using SPSS software, version 16.

RESULTS

Out of 60 subjects studied, we categorized our data as follows:

The study group was divided into two groups: 40-50 year age group & 50-60 year age group. Each group was again divided into three sub-groups.

- Subgroup A: Nonobese & Normotensives
- Subgroup B: Obese & Normotensives and
- Subgroup C: Obese & Hypertensives.

In the Age group between 40-50 years (n = 33), 14 were non-obese & normotensive (43%), 10 were Obese & normotensive (30%) & remaining 9 were Obese & Hypertensive (27%). In the Age group between 50-60 years (n = 27), 6 were non-obese & normotensive (22%), 10 were obese & normotensive (37%) & remaining 11 were obese & hypertensive (41%).

From table 1, 2 & 3 it is evident that BMI, SBP & MAP were significantly elevated in 50-60 year age group compared to 40-50 year age group males.

DISCUSSION

In this study, percentage of obesity with hypertension was higher with advancing age (50-60 year age group > 40-50 year age group males).

Systolic Blood Pressure (SBP) & Diastolic Blood Pressure (DBP) are more commonly used to assess cardiovascular status as they are easily measurable using a sphygmomanometer. Hypertension is defined as a systolic pressure of 140 mmHg or above or a diastolic pressure of 90 mmHg or above. Recent studies have increased clinical interest in analyzing pulse pressure (PP) and mean arterial pressure (MAP). The steady component is the MAP, which is considered constant from aorta to peripheral large arteries. Obesity increases total blood volume and cardiac output as a result of the increased metabolic demand induced by overweight . The various patterns of arterial pulse observed with ageing and in chronic hypertensive states may help us to understand the haemodynamic correlates of SBP and DBP [7,8].

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Table 1: Measured Parameters in 40-50 Years Age Group Males

AGE	BMI	SBP	DBP	MAP	PP
41	21.4	130	70	90	60
49	22.7	128	88	101	40
45	20.3	106	80	89	26
41	22.6	110	76	87	34
40	20	110	70	83	40
40	22.9	106	86	93	20
47	21.8	130	70	90	60
42	20.5	120	80	93	40
49	19.9	132	70	91	62
43	22.9	120	78	92	42
41	23.6	130	80	97	50
47	21.5	120	74	89	46
43	24.6	130	86	101	44
41	21.4	132	74	93	58
47	30.79	120	80	93.3	40
43	30.88	130	80	96.7	50
40	32.69	139	90	106.3	49
49	36.17	120	84	96.0	36
41	32.1	116	74	88.0	42
42	32.5	130	84	99.3	46
41	31.7	130	86	100.7	44
41	30	136	88	104.0	48
45	32.9	130	80	96.7	50
41	32.4	130	86	100.7	44
40	32.8	160	100	120.0	60
47	31.65	146	92	110.0	54
46	36.87	160	96	117.3	64
41	30.1	170	96	120.7	74
46	33.68	140	90	106.7	50
41	31	150	92	111.3	58
40	34.6	160	100	120.0	60
45	31.25	160	104	122.7	56
42	30.5	150	94	112.7	56

Table 2: Measured Parameters in 50-60 Year Age Group Males

AGE	BMI	SBP	DBP	MAP	PP
52	22.7	126	90	102.0	36
53	22.4	130	90	103.3	40
52	22.1	124	80	94.7	44
60	24.3	130	80	96.7	50
59	25	130	82	98.0	48
59	24.5	134	74	94.0	60
53	35.46	150	80	103	70
59	34.24	110	80	90	30
50	37.28	140	80	100	60
53	33.22	120	80	93	40
58	38.84	130	80	97	50
56	30.14	120	80	93	40
54	31.2	130	86	101	44
58	33.08	130	80	97	50
59	37.55	120	88	99	32
60	30.7	126	86	99	40
59	32.28	160	96	117	64
52	31.6	160	94	116	66
51	31.91	160	90	113	70
57	30.44	170	100	123	70
53	31	180	106	131	74
57	33.96	160	90	113	70
53	35.31	150	96	114	54
51	38.09	166	100	122	66
51	39.1	150	96	114	54
60	31.1	150	90	110	60
51	32.8	152	102	119	50

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Table 3: Comparison between 40-50 Year Age Group and 50-60 Year Age Group Males

AGE	BMI	SBP	DBP	MAP	PP
40 – 50 YEARS (n=33)	27.9 ± 5.5	132.8 ± 16.7	84.2 ± 9.4	100.4 ± 11.1	48.6 ± 11.3
50-60 YEARS (n=27)	31.5 ± 5.1	141 ± 18.3	88 ± 8.5	105.7 ± 11	53 ± 13
p VALUE	0.005	0.038	0.052	0.034	0.086
Significance	Highly Significant	Significant	Not Significant	Significant	Not Significant

Subgroup A showed significant increases in BMI, SBP, DBP & MAP. [Table 4]

Table 4: Subgroup A – Non-obese & Normotensive

AGE	BMI	SBP	DBP	MAP	PP
40 – 50 YEARS (n=14)	21.9 ± 1.4	122 ± 10	77 ± 6.4	92 ± 4.9	44 ± 12.8
50-60 YEARS (n=6)	23.5 ± 1.2	129 ± 3.5	83 ± 6.3	98 ± 3.8	46 ± 8.4
p VALUE	0.012	0.0159	0.038	0.006	0.345
Significance	Significant	Significant	Significant	Highly Significant	Not Significant

In Subgroup B, BMI showed significant elevated values & MAP was not significantly elevated. [Table 5]

Table 5: Subgroup B – Obese and Normotensive

AGE	BMI	SBP	DBP	MAP	PP
40 – 50 YEARS(n=10)	32.2 ± 1.7	128.1 ± 7.3	83 ± 4.7	98 ± 5.3	45 ± 4.6
50-60 YEARS(n=10)	34.2 ± 3.1	128.6 ± 11.3	82 ± 3.3	97 ± 4.0	46 ± 12.3
p VALUE	0.047	0.453	0.704	0.676	0.404
	Significant	Not Significant	Not Significant	Not Significant	Not Significant

In Subgroup C, although BMI & MAP were increased in 50-60 year age group, they were not statistically significant [Table 6]. BMI & MAP showed strong positive correlation in 40-50 year age groups [Table 7] & all other correlations were not statistically significant.

Table 6: Subgroup C – Obese and Hypertensive

AGE	BMI	SBP	DBP	MAP	PP
40 – 50 YEARS (n=9)	32.5 ± 2.2	155 ± 9.2	96.0 ± 4.6	116 ± 5.6	59 ± 6.9
50-60 YEARS (n=11)	33.4 ± 2.9	160 ± 9.5	96.4 ± 5.3	118 ± 5.9	63± 7.9
p VALUE	0.219	0.120	0.429	0.221	0.120
Significance	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

Table 7: Correlation between Measured Parameters in 40-50 Year & 50-60 Year Age Group Males.

40-50 YEAR MALES			50-60 YEAR MALES		
CORRELATIONS	r VALUE	p VALUE	CORRELATIONS	r VALUE	p VALUE
AGE & BMI	-0.022876559	0.91	AGE & BMI	-0.14521	0.47
AGE & MAP	-0.106402732	0.57	AGE & MAP	-0.35909	0.07
BMI & MAP	0.659471557	<0.0001 (Highly Significant)	BMI & MAP	0.253084	0.2

In our study, SBP, DBP, MAP & PP are high in 50-60 year age groups. MAP correlated positively with BMI in both age groups.[Table 1-7]

BMI is a measure of relative weight and is largely independent of height. It can be used to estimate the prevalence of obesity within a population and the risks associated with it. Body mass index is positively and independently associated with morbidity and mortality from hypertension, cardiovascular disease, type II diabetes

mellitus, and other chronic diseases. A comparable finding was also reported by Rosmond et al. among middle-aged men. Educational level and nutritional behaviour seem to be more important predictors of BMI than the level of physical activity of a given occupation [9,10,11].

CONCLUSION

Identification of percentage of population at risk among middle aged males is an important prerequisite for risk assessment, anti-hypertensive therapy and prophylactic measures to prevent obesity related morbidity & mortality.

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