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The association of body mass index with high blood pressure among adults

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ABSTRACT

Aim: The aim of this study was to determine the correlation of BMI and BP among adults. **Methods:** The descriptive research study (google form survey) was carried out on adult patient age group 30-90 years with hypertension disease, residing in Jogeshwari, Mumbai between 20 march to 10 April 2020, after being granted approval from the college. **Results:** We found that 55% participants were overweight and 27% participants were obese only 18% participants were normal/healthy. Therefore, Overweight and obesity are risk factors for HBP. The majority of individuals in this study with HBP are over 50 years old which is further followed by 40-49 years old. Therefore, age is also significantly associated with BP. We also observed that positive family history of HT as well as diabetes was significantly associated with BP. **Conclusion:** The study demonstrated that BMI is closely associated with BP among elderly population. Because From the results, it is very evident that overweight and obesity occur as a result of less physical activity. All the obese/over-weight participants do not engage in any form of exercise. Exercise is a very important factor to consider in decreasing the incidence of overweight and obesity in populations. This is because exercise helps the body to burn fat and utilizes excess calories. Therefore, the risk of hypertension was higher among population groups who were overweight or obese. BP is also associated with rising age independently. there was positive and significant correlation among BMI, age, BP. The increased rate of obesity or weight with respect to an increase in age could be due to the fact that older people are less physically active but maintain the same energy intake as during their earlier years. Hence, the excess energy that is not expended is stored as fat, increasing their chances of becoming obese. Prevalence of 27% prehypertension among overweight/obese suggested an early clinical detection of prehypertension and intervention including life style modification, particularly weight management.

Keyword— BMI (Body Mass Index), BP (Blood Pressure), HBP (High Blood Pressure), HT (Hypertension).

1. INTRODUCTION

As we all know, Hypertension is one of the main public health challenges because of its high frequency and also associated risks of cardiovascular and kidney diseases such as myocardial infarctions, strokes, and renal failures.

And this Hypertension is not only an important public health problem but also have a big economic impact because of this a significant/big proportion of the productive population becomes chronically ill with HBP and then they decide to stays at home only, leaves their job, or dies, leaving their families in poverty.

For example, in developing countries like INDIA where urbanization is expanding, lifestyles are changing, literacy rate is low, and also people are still living in poverty, hypertension and its impact on development and health is particularly critical. Therefore, there is a need to fill the gap regarding the magnitude (prevalence) of high BP and to identify factors associated with high BP in our country, which prompted me the conduct of this study.

Various factors contribute to the occurrence of hypertension including excessive intake of saturated fatty acids and higher consumption of salts, which are risk factors for cardiovascular diseases. Unhealthy diet and physical inactivity are major contribution of preventable morbidity and mortality from NCDs, including due to hypertension.

Sedentary life style is also a cause of overweightness that produces higher body mass indexes (BMIs) and waist-to-hip ratios. In turn, these factors are associated with hypertension and other cardiovascular diseases.

We tried to investigate the many factor associate with HBP but our main aimed to conduct the whole survey research is to find out the BMI AND HBP association. Because Obesity/overweight is an established independent risk factor for developing hypertension. Many studies showed that the effect of obesity or over weight on hypertension varies by the elevation of the residence area. Thus, at the beginning of the study we hypothesized that the interaction effect of body mass index (BMI) and elevation has a significant association with hypertension.

2. HYPOTHESIS

Obesity/overweight is an established independent risk factor for developing hypertension. Many studies showed that the effect of obesity or over weight on hypertension varies by the elevation of the residence area. Thus, we hypothesized that the interaction effect of body mass index (BMI) and elevation has a significant association with hypertension.

Hypothesis: There is a significant association between BMI (obese or over-weight) and age with hypertension.

Alternative hypothesis: There is no association between BMI and age with hypertension.

3. MATERIALS AND METHODS

3.1 Materials:

3.1.1 Study Population: The present study was conducted in month of march 2020- April 2020 at jogeshwari, Mumbai. The study population consists of 22 subjects (15 females and 7 male) age group 30-90years.

3.1.2 Type of Study: Descriptive research

3.1.3 Data Collection tool (google form structure): The survey questionnaires included:

The google form questionnaire were modified to collect information on socio-demographics, blood pressure, weight, height measurement.

The questionnaire in google form was divided into five segments such as

The **first section** collected the socio- demographic information of individual including name, age, sex, employment status, height and weight etc.

The **second section** health history which were comprised of age of onset of hypertension, reading of BP (past or current one), concomitant disease, current and past use of medications, any general problem past 30 days.

The **Third section** were comprised Lifestyle information included smoking, alcohol, diet (sodium use), and exercise, knowledge of BP, how often they feel have high BP etc.

The **fourth section** Healthcare access and behaviors included medical check-ups in the past 6 month and self-monitoring of BP.

The **fifth section** collected the family health history information included family history of hypertension, Family history of hypertension was defined as the subjects' direct relatives ever being diagnosed as hypertensive, such as parents, grandparents, children, grandchildren, brothers, or sisters.

3.1.4 Statistics Analysis: Microsoft excel program was used to carry out statistical analysis. Descriptive statistics of mean, mode, median, count, percentage were used to examine the data. The who recommended BMI values was used to find correlation between body weight and blood pressure.

3.2 Method

The present study was conducted on adult patient whose having hypertension disease, residing in Jogeshwari, Mumbai between 20 march to 10 April 2020, after being granted approval from the college.

The primary research method we used for this study is literature review and google form survey.

We designed a questionnaire in google form with both open-ended, closed-ended and multiple-choice question to assess the hypertension patients.

Survey form were distributed by email, social media and follow up phone calls to maximize the response rate. Afterward, constant comparative analysis is used to analyze data gathered from google form survey.

4. FINDING/RESULT

The survey investigated many areas of interest: patient demographics, duration of HBP, the age of hypertension sufferers, self-care practices, the presence of risk factors, the use of specific medications for treatment and association between BMI and HBP etc.

4.1 Response Rate

A total 22 individual are participated in this google survey/study.

4.2 Patient Demographics

Of the 22 hypertension patients completing the survey, 15 (68%) were women and 7 (32%) were men. All respondents provided data on age. Respondents' ages ranged from 31 years to 90 years, with a mean of 53.05. The median age was 50 years, and the mode was 50 years.

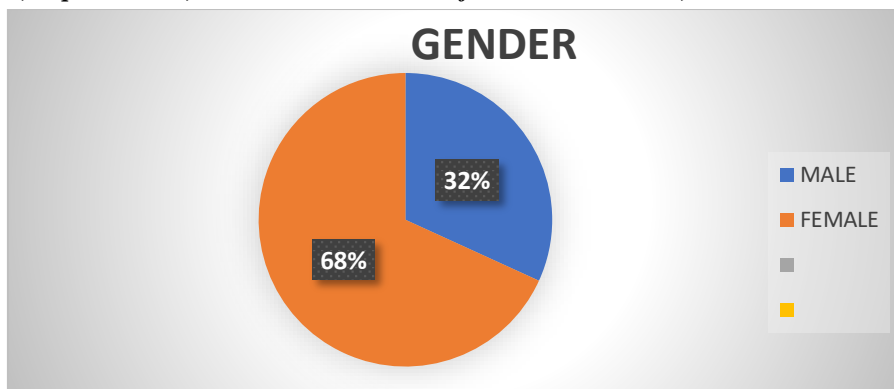


Fig. 1: Gender of participant

Duration of hypertension

Over 14% of the survey respondents were diagnosed more than 10 years ago. Sixty eight percent (68%) were diagnosed within the past 10 years, while only 18% were diagnosed within the past year. Indicating a high level of awareness of the duration of hypertension since diagnosis.

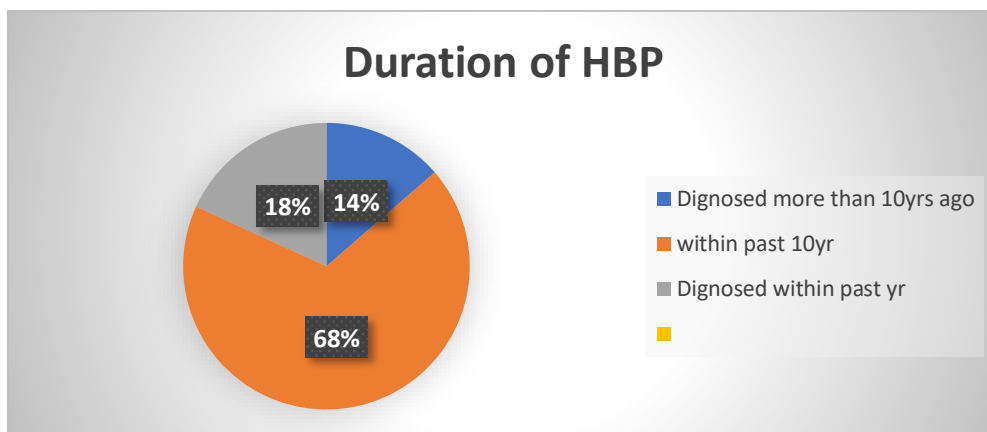


Fig. 2: Duration of HBP

Self-Care Practices

Over half (50%) of patients checked-up their blood pressure at regularly by visiting doctors in every month or 15 days gap, while 40% did so occasionally, and 1% did so rarely. Nine percent (9%) did not check their blood pressure past 6 months. Close to 90.91% reported taking oral medication to control their hypertension, while 9.09% did not currently use oral medication.

Age and Hypertension

Of the 22 hypertension patients completing the survey, 15 (68%) were women and 7 (32%) were men. All respondents provided data on age. Respondents' ages ranged from 31 years to 90 years, with a mean of 53.05. The median age was 50 years, and the mode was 50 years.

Among survey respondents indicating that they have high blood pressure, 50% are 41-50 years, 32% are in 51-60, 9% are in their 81-90, 5% are 61-70 years old and 4% are 31-40.

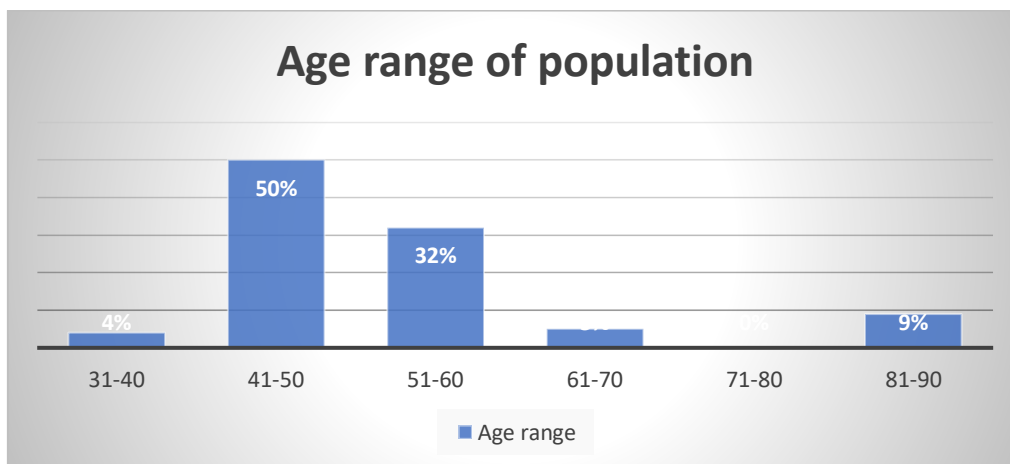


Fig. 3: Age range of population

Prevalence of Risk Factors

As Figure 4: Prevalence of Risk Factors shows, the most common risk factors reported were being overweight/obese (32%) and an inactive lifestyle (26%), which is often connected with obesity, are strong risk factors for high blood pressure. 19% reported having

diabetes and 14% having a family history of high blood pressure. 5% of the survey respondents smoke and 4% survey respondent's alcohol, 2% reported having heart disease. The data clearly shows that consumers should heed warnings to monitor and modulate their blood pressure if they are overweight or have a family history of high blood pressure.

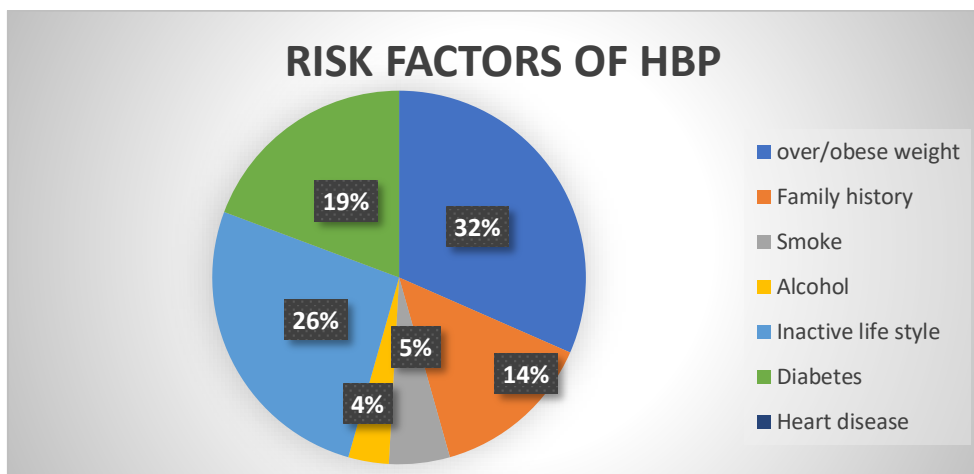


Fig. 4: Risk factor of HBP

Medications

Medications Used for Treating Hypertension indicates, Calcium Channel Blockers (80%) are used most frequently. diuretics (5%) and Alpha-Beta Blockers (2%) and Angiotensin Receptor Blocker (ARB) (3%) and ACE Inhibitor (10%) are used least often. It should be noted that 20 out of 22 (68%) survey respondents with hypertension are using medication.

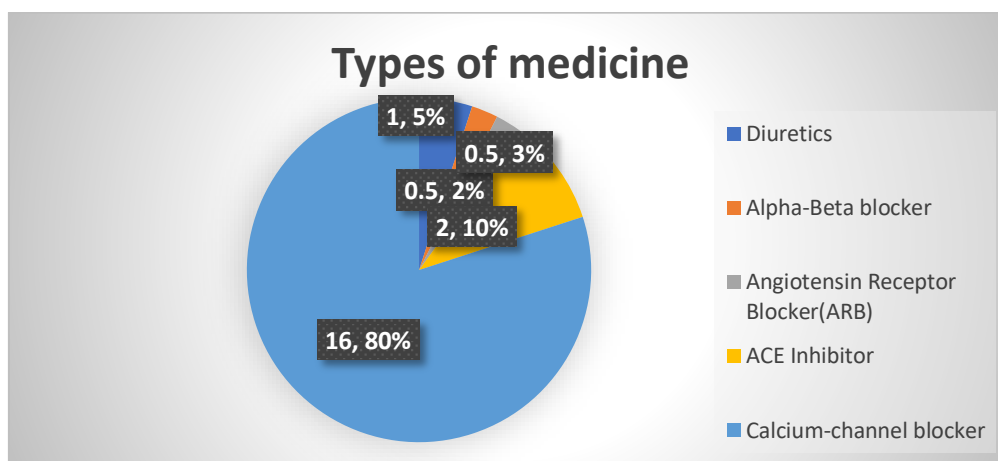


Fig. 5: Types of medicine

BMI and Hypertension

Our analysis includes 22 participants (15 women and 7 men), with a mean (SD) age of 53.05.

Among the study sample, the mean BMI was 28.46, the mean SBP was 145.6 mm Hg, and the mean DBP was 95.6 mm Hg.

The prevalence of prehypertension (SBP 120 – 139 mm Hg or DBP 80-89mm Hg) was 27% (n=6) ,prevalence of Stage 1 hypertension (SBP ≥140 mm Hg or DBP ≥90 mm Hg) was 32% (n=7), and the prevalence of stage 2 hypertension (SBP ≥160 mm Hg or DBP ≥100 mm Hg) was 36% (n = 8) and prevalence of hypertension crisis (SBP over 180 OR DBP over 120) was 5% (n=1).

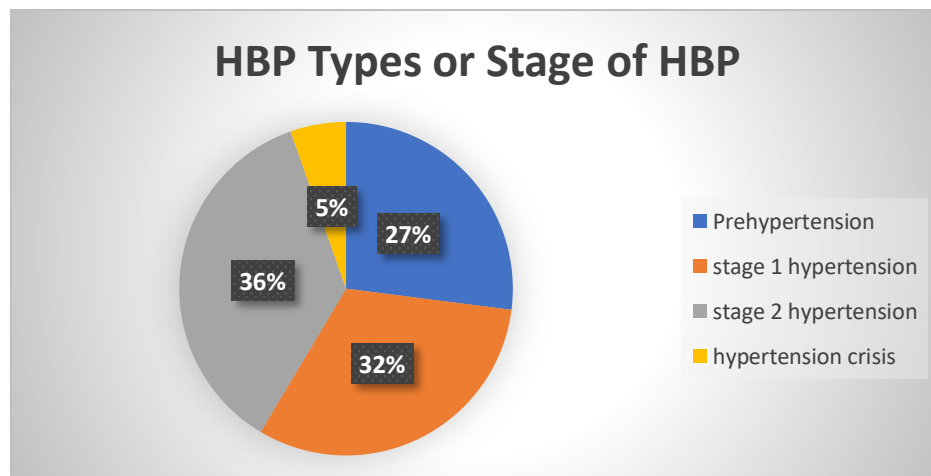


Fig. 6: Stage of HBP

Furthermore, 4 participants (18%) were normal weight (BMI 18.5-24.9), 12 participants (54%) were overweight (BMI 25.0-29.9), 5 participants (23%) were obese class 1 (BMI 30.0-34.9) and 1 participant (5%) were obese class 2 (BMI 35.0-39.0), as defined by the World Health Organization international classification.

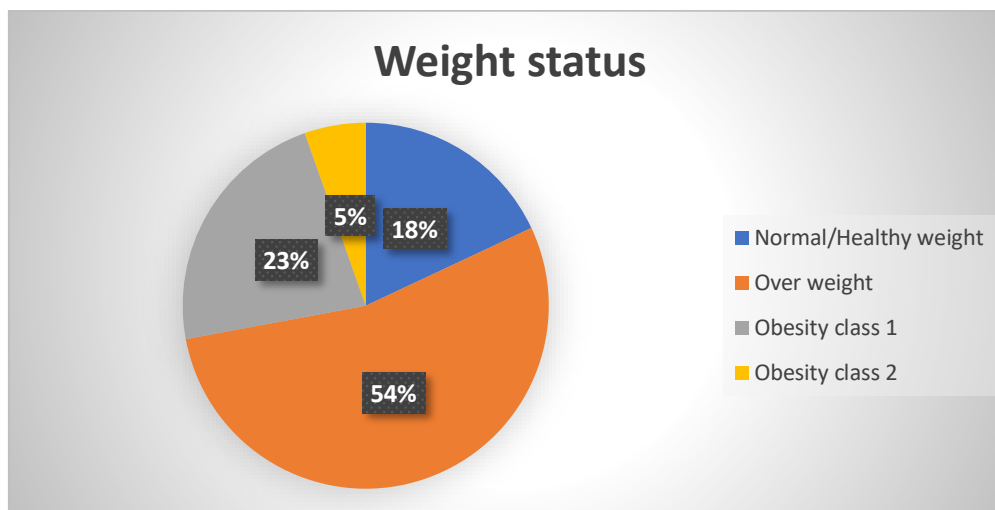


Fig. 7: Weight status of participant

5. DISCUSSION

This descriptive research method was conducted on adult patients of jogeshwari, Mumbai between 20 March to 10 April 2020, after being granted approval from the college. As 22 patients who participated voluntarily in this study were screened and data was obtained through a Google Form questionnaire which was designed to elicit information on socio-demographics, blood pressure, weight, height measurement, life style, medication and identify the factor that lead to high BP among adults etc.

We found that:

1) BMI AND HYPERTENSION

This study primarily focuses on BMI and associated factors in 30-90 aged group population at jogeshwari. BMI as a measure of body weight was classified according to the WHO as underweight, normal, overweight, and obese. Among 22 respondents, the percentage of overweight and obesity was highest among 50-59 years followed by 40-49 years. Among 22, 12 participants (55%) were overweight and 6 participants (27%) were obese only 4 participants (18%) were normal/healthy. Therefore, Overweight and obesity are risk factors for many diseases, including high BP. Hence, the prevalence of overweight and obesity is of a great importance to this study.

There was a significant difference between the BMI of males and females. Females had a higher prevalence of overweight and obesity than males. Among the 7 males, 4 were overweight while 2 was obese. The prevalence of overweight and obesity in 15 females was 8 and 4 respectively. This could be due to the fact that men are physically active than women. Out of 15 women Only 5 women physical activity (walking) whereas 6 men out of 7 engage in same.

It was also found that men work longer hours than women. For instance, all 7 men work/employed for full time whereas 13 women not currently working and only 2 women work for part time. Since working is a form of physical activity for most people (manual workers), it implies that working many hours will help to decrease the risk of becoming overweight or obese. Even among workers in white-collar jobs, working can help to reduce the risk of obesity because working increases energy expenditure since the brain utilizes the energy from food leaving little or none to be stored as fat. This implies that females are at risk of diseases associated with overweight and obesity, such as Type 2 diabetes mellitus, heart diseases, and stroke than males.

2) AGE AND HYPERTENSION

Hypertension is one of the most common chronic conditions seen in the elderly population. Because Age is a factor that affects the BMI of individuals. The increased rate of obesity or weight with respect to an increase in age could be due to the fact that older people are less physically active but maintain the same energy intake as during their earlier years. Hence, the excess energy that is not expended is stored as fat, increasing their chances of becoming obese. If control of obesity in the elderly helps in reduction of blood pressure, emphasis on active lifestyle and a healthy diet are cost effective measures in improving the quality of life in the elderly. Across these age groups study show, among all 18 obese/overweight, the highest rate (by 12 participant) of obesity or overweight was recorded by the 50-60 years' age group. But The data obtained from our study for the association of age and blood pressure is limited. Further studies in a larger scale are warranted to establish the correlation between the two.

3) SEDATIVES AND HYPERTENSION

The increased incidence of hypertension in males than females could be due to differences in lifestyle. For instance, more men smoke cigarette than women. In this study, there was a significant difference between males and females on smoking. **No** female smoke cigarette or alcohol, but 3 of the male participants smoke cigarette or 2 of the male participants drink alcohol (occasionally). Since smoking or alcohol is a risk factor for high BP, this observation is not surprising. This places men at a greater risk of hypertension and its consequent diseases than women.

4) PHYSICALLY ACTIVE AND HYPERTENSION

People are becoming less physically active in recent times due to urbanization. Because These days, most people prefer taking cars to walking. Furthermore, we do not engage in regular exercise.

And This study found that only 11 of the participants engage in exercise (only walking). Hence, it is not surprising that there is a high rate of overweight and obesity since a reduction in physical activity is associated with overweight and obesity.

From the results obtained in this study, it is very evident that overweight and obesity occur as a result of less physical activity. All the obese participants do not engage in any form of exercise. Exercise is a very important factor to consider in decreasing the incidence of overweight and obesity in populations. This is because exercise helps the body to burn fat and utilizes excess calories.

5) LIFE-STYLE AND HYPERTENSION

The physical activity assessment using physical activity and life style questionnaire suggested that (4)18.2% women were leading a sedentary lifestyle and only (11) 50% women reported to perform some form of activity(moderately active), commonly being performing household chores, working as domestic help and maids and light work outside household and remaining 7 (31.8%) men are highly active.

because women in slums (or even in upscale/high class area) have limited physical space, going out for walking or for exercising is not culturally/socially acceptable, and may give rise to safety issues. Sitting for long hours watching television, chatting with relatives and friends, were their leisure activities women were not very keen on taking up exercise. It is evident that moderate physical activity, like brisk walking may be beneficial for the improvement of quality of life. Interventions to increase physical activity should be recommended to prevent increase in BMI.

6) OTHERS RISK FACTORS

Here, in the present study, Although the underlying causes of hypertension are largely unknown but we also attempted to study and identify the factors that lead to high BP among this studied age group. We observed that positive family history of HT as well as diabetes was significantly associated with hypertension. Although the underlying causes of hypertension are largely unknown but lifestyle and heredity play a significant role in determining who will develop high blood pressure. The survey plumbed these factors by asking respondents to indicate which of the risk factors they have.

Prevalence of Risk Factors shows, the most common risk factors reported were being overweight/obese (32%) and an inactive lifestyle (26%), which is often connected with obesity, are strong risk factors for high blood pressure. 19% reported having diabetes and 14% having a family history of high blood pressure. 5% of the survey respondents smoke and 4% survey respondent's alcohol, 2% reported having heart disease. The data clearly shows that consumers should heed warnings to monitor and modulate their blood pressure if they are overweight or have a family history of high blood pressure.

6. CONCLUSION

The following conclusions can be drawn from this survey:

- Among 22, 12 participants (55%) were overweight and 6 participants (27%) were obese only 4 participants (18%) were normal/healthy. Therefore, Overweight and obesity are risk factors for many diseases, including high BP. Hence, the prevalence of overweight and obesity is of a great importance to this study.
- The majority of individuals with high blood pressure are over 50 years old 14(53%); however, 6 (26%) of respondents with high blood pressure are between 40 and 50 years old. This signals a need for health consumers to begin monitoring their blood pressure younger.
- Overweight/obese (32%) and an inactive lifestyle (26%), which is often connected with obesity, are strong risk factors for high blood pressure. 19% reported having diabetes and 14% having a family history of high blood pressure. 5% of the survey respondents smoke and 4% survey respondent's alcohol, 2% reported having heart disease. The data clearly shows that consumers should heed warnings to monitor and modulate their blood pressure if they are overweight or have a family history of high blood pressure. also, this suggests that health consumers need to manage their lifestyle to maintain normal blood pressure.
- Medications Used for Treating Hypertension indicates, Calcium Channel Blockers (80%) are used most frequently. diuretics (5%) and Alpha-Beta Blockers (2%) and Angiotensin Receptor Blocker (ARB) (3%) and ACE Inhibitor (10%) are used least often. It should be noted that 20 out of 22 (68%) survey respondents with hypertension are using medication.
- 90.91% of survey participants with high blood pressure indicated that they used medication to treat their hypertension.

As our study shows that the association of BMI with hypertension is stronger for overweight and obesity. Therefore, public health measures to reduce population-level reduction in BMI in all population groups would help in lowering the burden of hypertension.

There are several options for the treatment of hypertension is available which include changes in lifestyle as well as medication. Many patients with high blood pressure are able to regulate their hypertension through lifestyle management strategies such as reducing the salt in their diet, losing weight, quitting smoking, exercising more and reducing their alcohol intake.

But For many patient's lifestyle modification alone will not reduce blood pressure to normal ranges. Therefore, these patients must take medication to regulate their blood pressure. A number of medications are available, but patients must continue to take these drugs for the remainder of their lives or face the consequences of untreated high blood pressure. As with any long-term disease process, patient compliance is essential for long term positive outcomes.

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ANNEXURES

Respondents participant excel sheet report

NAME	SEX	AGE	EMPLOY STATUS	HEIGHT	WEIGHT	AGE ONSET	BP	TIME SBP	DBP	CURR.BP	WHICH MEDICINE	BMI	WTSTATUS
AISHA BEE SHAIK	FEMALE	90	NOT CURT. WORK	4FT 11INC	60	50	130/90		130	90 120/80	NOT TAKING CURRENTLY	26.70226	OVER WT
AISHWARYA	FEMALE	45	EMPLOYED PART-T	5FT 3INC	68	43	140/90		140	90 120/70	AMLODIPINE RARELY TAKG	26.55586	OVER WT
ANSARI SABRA	FEMALE	46	NOT CURT. WORK	5FT 4INC	65	38	200/120		200	120 120/70	TELMA AM, LABELTOLOL	24.58512	NOR/H WT
HAJARA BEE SAY	FEMALE	65	NOT CURT. WORK	5 FT	56	30	140/90		140	90 120/80	AMLIP-5 (CIPLA)	24.11116	NOR/H WT
NAFISA SHAIKH	FEMALE	54	NOT CURT. WORK	5FT	60	50	140/90		140	90 120/80	AMLIP-5	25.83339	OVER WT
NASEEM BANO	FEMALE	50	NOT CURT. WORK	4FT 11INC	65	45	146/84		146	84 130/70	AMLODIPINE	28.92745	OVER WT
NASEEM BANO K	FEMALE	53	NOT CURT. WORK	5FT	50	52	160/100		160	100 120/80	AMLODIPINE	21.52782	NOR/H WT
RAFAT JAHAH SH	FEMALE	52	NOT CURT. WORK	5FT 2INC	70	52	160/100		160	100 120/80	NOT TAKING CURRENTLY	28.21869	OVER WT
SAIRA BANO	FEMALE	55	NOT CURT. WORK	5FT 2INC	80	50	138/90		138	90 130/80	AMLIP-5	32.24994	OBS 1
SAJEDA BANU	FEMALE	50	NOT CURT. WORK	5 FT	65	46	130/90		130	90 120/80	AMLODIPINE	27.98617	OVER WT
SAJIDA BEGUM P	FEMALE	50	NOT CURT. WORK	4FT 10INC	80	40	HIGH		140	90 140/90	LISINPRIL, AMLODIPINE	36.87096	OBS 2
SAJIDA SAYYED	FEMALE	42	EMPLOYED PART-T	5FT 3INC	89	37	130/90		130	90 110/70	AMLODIPINE	34.75694	OBS 1
SHEHZADI	FEMALE	85	NOT CURT. WORK	5FT 1INC	70	70	180/100		180	100 130/80	AMLOPRES-AT	29.15889	OVER WT
SHRILAXMI NAIR	FEMALE	53	NOT CURT. WORK	5FT 2INC	65	50	140/100		140	100 130/90	AMLODIPINE	26.20307	OVER WT
ZEENAT KHAN	FEMALE	55	NOT CURT. WORK	5FT 2INC	80	53	140/100		140	100 120/70	AMLIP-5	32.24994	OBS 1
BADRUDDIN KHAN	MALE	50	EMPLOYED FULL T	5FT 4INC	70	49	130/90		130	90 130/80	AMLODIPINE	26.47628	OVER WT
JAVED KHAN	MALE	31	EMPLOYED FULL T	5FT 3INC	75	30	130/90		130	90 120/80	AMLODIPINE	29.28955	OVER WT
KALIM	MALE	57	EMPLOYED FULL T	5FT 5INC	90	53	180/120		180	120 140/100	CHLORTHALIDONE	33.01782	OBS 1
MUKHTAR ANSA	MALE	45	EMPLOYED FULL T	5FT 4INC	75	43	140/100		140	100 120/80	AMLODIPINE	28.36744	OVER WT
MUSHTAQUE SH	MALE	45	EMPLOYED FULL T	5FT 3INC	75	43	140/90		140	90 120/80	LISINOPRIL	29.28955	OVER WT
RIYAZ SHAIKH	MALE	47	EMPLOYED FULL T	5FT 7INC	60	45	140/100		140	100 130/80	AMLOPRES-AT	22.4438	NOR/H WT
VISHAL SINGH	MALE	47	EMPLOYED FULL T	5FT 3INC	80	45	130/90		130	90 120/80	AMLODIPINE	31.24219	OBS 1
	MEAN	53.04545							145.6364	95.63636		28.45747	
	MEDIAN	50											
	MODE	50											