

Prevalence Of Undiagnosed Hypertension Amongst Patients Attending Goenka Research Institute Of Dental Science, Piplaj Gandhinagar, India- A Cross Sectional Study

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Abstract: Background and Aim: Hypertension is one of the medical conditions that are of great importance in the management of dental patients. It may present as an emergency during dental treatment or necessitate a change in patient's management. Present study was performed with an aim to determine the prevalence of undiagnosed hypertension and how well controlled diagnosed hypertensive patients presenting at a dental out-patient clinic in Goenka research institute of Dental Science, India. Methodology: A cross sectional survey of patients presenting at the Goenka research institute of Dental Science, Piplaj Gandhinagar India between July and October 2015 was undertaken. Consenting patients above 15 years of age had their blood pressure assessed with the aid of a digital sphygmomanometer. The relationship between blood pressure and body mass index, family history of hypertension as well as socioeconomic status were assessed. Statistical significance was set at $p < 0.05$. Results: A total of 552 subjects were recruited into the study, with 107 (19.4%) of them previously on antihypertensive drugs but only 14 (13.0%) of those on antihypertensive had a normal blood pressure. Forty-one (9.2%) subjects were hypertensive but were not aware of it. There was a statistically significant relationship between positive family history of high blood pressure and high diastolic blood pressure. There was also a statistically significant relationship between blood pressure and age ($p < 0.05$). Conclusion: The study demonstrated that hypertensive patients constitute an important proportion of dental patients. Thus, the dental profession has a unique role to play in the early detection of hypertension, thus reducing its complications. In addition, it was established that verbal information obtained from patients about their status of hypertension is insufficient for optimal dental management. [Soham P NJIRM 2016; 7(6):20-24]

Key Words: Body mass index, Cross sectional, Hypertension, Socioeconomic status

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Introduction: Hypertension is one of the most common chronic medical disorders ¹ affecting about 20% of the adult population with a total of about one billion people worldwide being affected. It is one of the leading causes of mortality, contributing to more than 7.1 million deaths annually. ² Hypertension is the third largest cause of disability in the world, 54% of stroke and 47% of cardiac death are attributable to suboptimal blood pressure control. ^{1,2} Hypertension is quite common in the India and other Asian Countries, where there are scarce resources to manage it and the procedure for detection is haphazard. ^{3,4} It is the most frequently diagnosed medical condition in elderly Indians and the most commonly associated condition with dementia as well as the most common cause of sudden unexpected natural death. ^{5,6}

Hypertensive patients presenting at the dental clinic can be divided into three groups the undetected, non-compliant and controlled hypertensive. ⁷ Dental

management of controlled hypertensive patients requires optimal pain control, stress and anxiety reduction to prevent hypertensive crisis. Sudden acute increase in blood pressure have been associated with hypertensive crisis which may be complicated by target organ abnormalities such as seizures, intracranial hemorrhage, posterior reversible encephalopathy, papilledema, retinal hemorrhages or acute vision loss. ⁸ Dental treatments must therefore be deferred in severe uncontrolled hypertension. Dentists must also be aware of the possibility of renal compromise and drug interactions in these patients such as, interaction between vasopressors and non-selective beta- blockers, which may predispose to hypertensive episode. ⁹ Despite the importance of hypertension to the dental profession, only a few dentists check their patients' blood pressure before dental procedures. ¹⁰ This study aimed at assessing the prevalence of high blood pressure among dental out-patients and how well controlled the blood pressure

of patients with a previous diagnosis of hypertension was at the Goenka research institute of Dental Science, Piplaj Gandhinagar India.

Methods: A cross sectional survey of 552 patients presenting at the Goenka research institute of Dental Science, Piplaj Gandhinagar between the months of July and October 2015 was undertaken. Ethical clearance was taken from the institutional review board and informed consent was obtained from all the participants. The blood pressure of each of the subjects was measured with the aid of a digital sphygmomanometer after the subject had been seated quietly on a chair for at least 5 minutes. The sitting position during the measurement was such that the feet of the subjects were comfortably on the floor, their backs rested on the chair and their right arm supported on a table. The cuff of the sphygmomanometer was placed around the upper arm, at the level of the heart of respondent. After which the device was switched on to inflate the cuff and the systolic as well as the diastolic blood pressures were displayed on the screen. The average of two readings within an interval of 5 minutes was recorded for each of the respondents. Use of caffeine, physical exercise and smoking within 30 minutes prior to the measurement was taken as exclusion criteria for the study. The blood pressure of the subjects was classified according to the recommendation by Chobanian et al,¹¹ as follows:

Training and calibration: Before the commencement of the study, the examiner was standardized and calibrated in the Dental Hospital by a senior Faculty member to ensure uniform interpretation, understanding and application of the codes and criteria for the diseases to be observed and recorded and to ensure consistent examination.

The subjects' weight and height were measured while the body mass index was calculated using the formula below by World Health Organization (WHO).¹²

$BMI = \text{Weight (Kg)} / \text{height}^2 \text{ (m}^2\text{)}$

Body mass index in Kg/m² was classified as follows:

Underweight - < 18.50, Normal weight - 18.50 - 24.99, Overweight - ≥ 25.00

The socio-economic status (SES) of subjects was determined based on their occupation and educational attainment. Each of the participants was scored on a scale of 1 to 5 for both their occupations

and their educational status. The mean score of these two criteria to the nearest whole number was calculated as the social class for each of them. The mean score of 1 was classified as high social class, 2 and 3 as middle class, while 4 and 5 were categorized as low social class.¹³

The data was coded and entered into Microsoft Excel spreadsheet. Analysis was done using SPSS version 15 (SPSS Inc. Chicago, IL, USA) Windows software program. Descriptive statistics included computation of percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively

Table 1: Distribution of the Mean Blood Pressure According to the Age Group of the Subjects

Age group	Number (%)	Systolic Blood Pressure (Mean± SD)	Diastolic Blood Pressure (mmHg) (Mean± SD)
<20	8 (1.4)	115.8±14.6	62.4±10.6 20
20-29	118 (21.4)	112.7±11.3	70.9±10.1 30
30-39	150 (27.2)	119.5±14.0	75.6±13.0 40
40-49	119 (21.5)	122.3±14.2	79.6±11.3 50
50-59	76 (13.8)	129.3±16.3	80.3±13.3
>60	81 (14.7)	134.8±18.8	80.2±14.4

Table 2: Comparative Analysis of the Systolic Blood Pressure of Subjects with their Body Mass Index

Systolic Blood Pressure	Body mass index			Total (%)
	Under weight (%)	Normal Weight (%)	Over Weight (%)	
Normal	15 (83.3)	165 (45.6)	58 (33.7)	238 (43.1)
Prehypertension	2 (11.1)	143 (39.5)	82 (47.7)	227 (41.1)
Stage 1 hypertension	1 (5.6)	46 (5.6)	30 (17.4)	77 (13.9)
Stage 2 hypertension	0	8 (2.2)	2 (1.2)	10 (1.8)
Total	18 (100)	362 (100)	172 (100)	552 (100)

Results: A total of 552 subjects consisting of 255 (46.2%) male and 297 (53.8%) female were recruited into the study. The age of the subjects ranged from 16 to 81 years with a mean of 41.6 ± 14.0 years. The mean blood pressure was 122.2 ± 16.3 SBP and 76.7 ± 12.8 mm Hg DBP. Two-hundred and two (36.6%) of the subjects had a positive family history of

hypertension, while the remaining 350 (63.4%) had no such history. There was a statistically significant relationship between a positive family history of hypertension and high DBP ($p < 0.003$) but not with SBP.

Two hundred and thirty eight (43.1%) and 321 (58.2%) of the subjects had normal SBP and DBP respectively, while 77 (13.9%) and 55 (10.0%) had their blood pressure in the range of stage 1 hypertension for systolic and diastolic blood pressure respectively. There was a statistically significant relationship between age and blood pressure ($p < .000$). The mean blood pressure also tends to increase with subjects' age and this was steeper with the diastolic than the systolic blood pressure (Table 1).

One hundred and eight (19.6%) subjects admitted to having been diagnosed as being hypertensive prior to the study but only one of them knew that his blood pressure was still sub optimal. One hundred and seven of them were already on antihypertensive medication and were of the opinion that their blood pressure was controlled. However, assessment of their blood pressure revealed that only 14 (13.0%) of those that had previous history of hypertension had their blood pressure within the normal range. Thirty-seven (8.3%) out of the 444 subjects that had no previous history of hypertension had their blood pressure within the stage 1 hypertension range, while 4 (0.9%) had their blood pressure in the stage 2 range. There was a statistically significant relationship between past history of hypertension and elevated blood pressure in this study ($p = .000$).

Ninety-four (36.9%) male and 144 (48.5%) female subjects in this study had their blood pressure within the normal range, while 27 (10.6%) males and 50 (16.8%) females had their blood pressure within the range of stage 1 hypertension. This was statistically significant ($p < .000$). Among those considered to be over-weight, 58 (33.7%) had normal blood pressure, 30 (17.4%) had their blood pressure within the stage 1 hypertension. There was a statistically significant relationship between the body mass index and systolic blood pressure ($p < .002$) (Table 2). Two (5.3%) of those in the high socioeconomic status (SES), 38 (10.6%) of those in the middle SES and 37 (23.6%) of those in the low SES were found to be in the stage 1 SBP. There was a statistically significant difference when the socioeconomic status of the respondents

was compared with their systolic blood pressure ($p < .001$) and diastolic blood pressure ($p < .023$).

Discussion: In this study, the blood pressure of subjects ranged from 82 to 210 mm Hg SBP and 45 to 120 mm Hg DBP, which is lower than that from the study by Kellogg and Gobetti (2004) among some dental patients in the United States of America.¹⁴ About 43.1% of the subjects in the present study had their SBP within the normal range, while 58.2% had normal DBP. There was an increase in blood pressure with advancement in age. This trend has been observed by many researchers and age has been identified as one of the most important risk factors for elevated blood pressure.^{15, 16} The increase in blood pressure was steeper for diastolic blood pressure than SBP in this study, which is in contrast with the finding of Heller et al.¹⁷

One of the respondents in this study with systolic blood pressure in stage 1 hypertension was younger than 20 years of age and had neither a previous history of high blood pressure nor a close relative that was a known hypertensive. Hypertension is a common chronic disease in the paediatric population with an estimated prevalence of 2-5% and like that in adults, it may be secondary or essential.^{18, 19} In pre-adolescent children, hypertension is often a secondary disease, usually sequel to renal diseases such as nephrotic syndrome, nephritis and endocrine diseases e.g. pheochromocytoma, while in adolescents, essential hypertension is more prevalent with risk factors such as genetic predisposition, dietary habits and obesity.²⁰ Hypertension in children and adolescents is frequently associated with complications such as left ventricular hypertrophy seen in about 41% of cases and other frequently observed complications include diastolic dysfunction, seizures, urinary albumin excretion and arteriosclerosis.²¹

Poor knowledge of the nature of hypertension is an important cause of poor compliance because some consider the use of medications unnecessary once they are 'feeling well'; others are worried about the potential side effect of prolonged drug therapy.²² Other reasons associated with poor compliance include poverty, cost of transportation to medical centre, cost of drugs, cost of hospital consultation, overemphasis on side effects of drugs, complex treatment regimen, poor social support network and

the belief that a cure has been achieved once symptoms have subsided.^{23, 24}

The possibility of white coat hypertension exists in this group of subjects, but this had been reported to be of clinical significance. "White coat" anxiety-induced elevation of blood pressure has been associated with cardiovascular anomalies such as abnormalities of the left ventricular function and the large arteries similar to that observed in hypertensive patients.^{25, 26}

Therefore, elevated blood pressure at a dental facility should not be dismissed on the assumption that it could be due to anxiety induced by the dental environment which several patients consider stressful.^{27, 28} Forty-one (9.2%) of those that had no knowledge of being hypertensive were found to be hypertensive in this study. This was low in comparison with the finding by Kellog and Gobetti, [14] who reported that 77 (18.5%) of the 417 that were previously not diagnosed as being hypertensive had elevated blood pressure. Considering the high prevalence of hypertension in our modern world and its importance to patients' wellbeing, quality of life, as well as successful dental management, the dental profession must play a more active role in the early detection of elevated blood pressure.^{29, 30}

There was a significant relationship between BMI and hypertension, which is in line with previous studies,¹⁵⁻¹⁷ although a greater percentage of respondents that were considered as either under or normal weight in this study also had normal systolic blood pressure, some of them were found to have had high SBP. Hypertension is more prevalent in males than females before menopause, which had been attributed to the cardiovascular protective effects of estrogen.^{31, 32} Pyle et al³³ also reported that more men (20.7%) were hypertensive compared to women (6.3%). The reason why estrogen did not make much difference in the blood pressure of females in the present study is not clear.

Conclusion: Present study demonstrated that a significant proportion of patients presenting at the Goenka research institute of Dental Science, Piplaj Gandhinagar have high blood pressure. In addition, this study established that verbal information from patients about their hypertensive status is insufficient for optimal dental management of these patients. We recommend that blood pressure should be assessed in all patients at first consultation and then annually. Known hypertensive patients should have their blood

pressures checked at every dental consultation as well as pre and post invasive dental treatments.

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