

Is Screening in Dental Office an Effective Method of Detecting Undiagnosed Hypertension?

Abstract

Background: Hypertension is an important worldwide public health challenge because of its high frequency and risk of cardiovascular and renal disease. **Objective:** The objective of this study was to investigate the prevalence of undiagnosed hypertension as well as inadequately controlled hypertension among general population who sought tooth extraction at Army College of Dental Sciences, Secunderabad. **Materials and Methods:** Only 1200 patients in the age group of 20–60 years who sought tooth extraction were included in the study. Blood pressure (BP) was measured for three times in all patients. The readings were quantized into four categories which included normal, prehypertensive stage, and Stage 1 and Stage 2 of hypertension. The BP was assessed for the following variables – gender, habits of gutkha chewing, smoking and alcohol, regular exercise, age, and effect of local anesthesia. **Results:** Nearly 24.4% of new cases of hypertension were diagnosed among all participants reported to the dental clinic. After giving local anesthesia, 16.71% increase in BP was observed in Stage 1 and 2.35% increase in Stage 2 hypertension. **Conclusion:** This study reveals that dentists play an important role in the early diagnosis of hypertension of many dental patients who are unaware of being hypertensive. This role should be emphasized in our specialty as a standard of care to prevent life-threatening complications.

Keywords: Dentist, hypertension, screening

Introduction

Hypertension is an important worldwide public health challenge because of its high frequency and concomitant risk of cardiovascular and renal disease.^[1] It is already a highly prevalent cardiovascular risk factor worldwide because of increasing longevity and due to contributing factors such as obesity.^[2] The WHO has identified hypertension as one of the most important causes of mortality and morbidity.^[3]

An alarming rise in hypertension in India has been projected by the Global Burden of Hypertension 2005 study which suggested that 20.6% of Indian men and 20.9% of Indian women were suffering from hypertension, contributing to 57% of all stroke deaths and 24% of all coronary heart diseases.^[4]

A patient with hypertension is at greater risk for serious complications or death than a normotensive patient. The American Society of Anesthesiologists has observed that during routine dental therapy the possibility of cardiovascular complications

in a hypertensive patient should be anticipated. Many patients with undiagnosed or uncontrolled high blood pressure (BP) seek dental treatment on a regular basis and many (73%) of them have been referred to a family physician by the dentist.^[5]

The role of dentists in diagnosing and assessing risk factors for hypertension is essential and should be considered as a part of standard dental care. The 8th report of the Joint National Committee on Prevention, Detection, Evaluation and Retreatment of High Blood Pressure 2003 included dentists in their report to help with surveillance. Evaluating the BP and reviewing patient's BP medication while taking the history of the patient in the dental clinic is of utmost importance as most patients with hypertension may have no symptoms. This could also prevent the possibility of cardiovascular complications during routine dental therapy.

The cost of equipment (a stethoscope and a mercury sphygmomanometer) for measuring the BP is affordable and the procedure itself is noninvasive, hence can be applied to all population groups.^[5]

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Access this article online

Website: www.ijdr.in

DOI: 10.4103/ijdr.IJDR_298_17

Quick Response Code:



How to cite this article: Rao SS, Ramana Reddy KV, Nath P, Bindra S, Jadaun G. Is screening in dental office an effective method of detecting undiagnosed hypertension?. *Indian J Dent Res* 2018;29:534-9.

Aims and objectives

The objective of this study was to investigate the prevalence of undiagnosed hypertension as well as inadequately controlled hypertension among general population who sought tooth extraction at Army College of Dental Sciences, Secunderabad.

Materials and Methods

Sample size: The study included 1200 patients who visited the Department of Oral and Maxillofacial Surgery at Army College of Dental Sciences, Secunderabad, for extraction from May 2016 to July 2016.

Inclusion criteria

All patients within the age of 20–60 years were included in the study. Patients were questioned for hypertension, diabetes, habit of smoking, and alcohol consumption while taking history. All known hypertensive patients were taking antihypertensive medications and were included in the study. Extraction was deferred in all the patients who presented with increase in BP, i.e. Stage 1 and Stage 2 hypertension in the first reading. These patients were included in the study.

Exclusion criteria

Pregnant and lactating mothers, patients aged below 20 years, patients aged above 60 years, and patients who required surgical extraction were not included in the study.

Ethical clearance was obtained from the Institutional Ethics Committee of Army College of Dental Sciences, Secunderabad.

Methodology

All the participants were explained about the study, and an informed written consent was obtained for the same.

Both palpatory and auscultatory methods were used to record BP.

The BP was measured on the left arm. In palpatory method, radial pulse was monitored to measure BP. In auscultatory method, brachial pulse was monitored using a sphygmomanometer and a stethoscope, while the patient was seated in a comfortable position in the dental chair.

The BP was measured for at least three times in all patients. The first recording of BP was obtained immediately after the patient was seated in the dental chair (step 1) after waiting for 10–15 min in the outpatient department. A standardized medical questionnaire was filled by the operating dentist after taking a detailed medical history and measuring the patient's BP. Local anesthesia containing 2% lignocaine with 1:80,000 adrenaline was immediately administered after the completion of questionnaire. The second reading was received within 5 min after administration of local anesthesia (step 2). The third reading was acquired after the tooth extraction (step 3). The anxiety level of patients was not assessed.

The readings obtained were quantized into four categories which included normal, prehypertensive stage, and Stage 1 and Stage 2 of hypertension^[6] [Table 1]. These categories are according to the 8th Report of the Joint National Committee on the Management of High Blood Pressure in Adults, published hypertension guidelines in 2013.

Patients who had increase in BP than normal (>140/90 mmHg) with respect to the first reading were referred to their family physician and extraction was deferred in these patients.

All the three readings of BP were obtained in the remaining patients.

The BP was assessed for the following variables after the first reading of BP was obtained.

Table 1: Classification of hypertension

Category	Systolic BP	Diastolic BP
Normal	<120	<80
Prehypertension	120-139	80-89
Hypertension, Stage 1	140-159	90-99
Hypertension, Stage 2	≥160	≥100

BP=Blood pressure

Table 2: Association of Hypertension with age before giving Local Anaesthesia

BP stages (Step 1)	20-30, n (%)	31-40, n (%)	41-50, n (%)	51-60, n (%)
NR	80 (60.15)	82 (33.46)	59 (33.14)	22 (7.48)
PH	53 (39.84)	145 (59.18)	90 (50.16)	131 (44.56)
S1	0	18 (7.34)	29 (16.29)	141 (47.95)
S2	0	0	0	0

BP=Blood pressure, PH=Prehypertension, NR=Normotensive, S1=stage 1 hypertension, S2=stage 2 hypertension

Table 3: Association of Hypertension with age after giving Local Anaesthesia

BP stages (Step 2+3)	20-30, n (%)	31-40, n (%)	41-50, n (%)	51-60, n (%)
NR	51 (38.34)	52 (21.22)	20 (11.23)	18 (6.12)
PH	82 (61.65)	125 (51.02)	90 (50.56)	62 (21.08)
S1	0	68 (27.75)	68 (38.20)	194 (65.98)
S2	0	0	0	20 (6.80)

BP=Blood pressure, NR=Normal

Table 4: Hypertension before and after giving local anaesthesia

BP stages	Local anaesthesia	
	Before, n (%)	After, n (%)
NR	243 (28.58)	141 (16.58)
PH	419 (49.29)	359 (42.23)
S1	188 (22.11)	330 (38.82)
S2	0	20 (2.35)

BP=Blood pressure, PH=Prehypertension, NR=Normotensive, S1=stage 1 hypertension, S2=stage 2 hypertension

1. Gender
2. Personal habits of gutkha chewing, smoking, and alcohol
3. Medical conditions
4. Regular exercise
5. Age
6. Effect of local anesthesia.

Analysis

Results were analyzed using SPSS 18 version software (SPSS Inc., Chicago). Descriptive analysis was performed.

Results

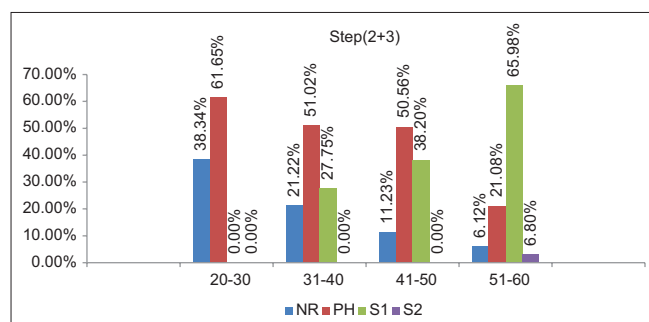
The present study was conducted on 1200 patients (470 men and 730 women) in the age group of 20–60 years. The study population was categorized into four groups based on the age. Two hundred and eleven patients were in the age group of 20–30 years, 327 patients were in the age group of 31–40 years, 314 patients were in the age group of 41–50 years, and 311 patients were in the age group of 51–60 years.

In our study, of the 1200 patients, 293 new patients were diagnosed with hypertension, who were unaware of their condition (278 patients in Stage 1 hypertension [23.20%] and 15 patients in Stage 2 hypertension [1.20%]).

One hundred patients were known hypertensives and all were taking antihypertensive medication. Fifty-seven patients had inadequately controlled BP and were deferred from extraction (4.75%).

Correlation of BP and age was carried out which revealed that most of the patients in older age group (51–60 years) were in Stage 1 hypertension. The same age group of patients experienced significant rise in BP postextraction. Maximum patients in the age group of 31–40 years were found in the prehypertensive stage both pre- and postextraction [Tables 2 and 3]. Furthermore, more number of patients in the age group of 41–50 years were found in the prehypertensive stage followed by Stage 1 postextraction [Table 2 and 3, Graph 1].

Amongst the patients who were found to have various systemic disorders as mentioned in the questionnaire, and



Graph 1: Number of patients in various stages of hypertension after the second and third reading of blood pressure

were taking medications for the same 52.10% of patients were found in prehypertensive stage and 32% of them were recorded under stage 1 hypertension [Graph 2].

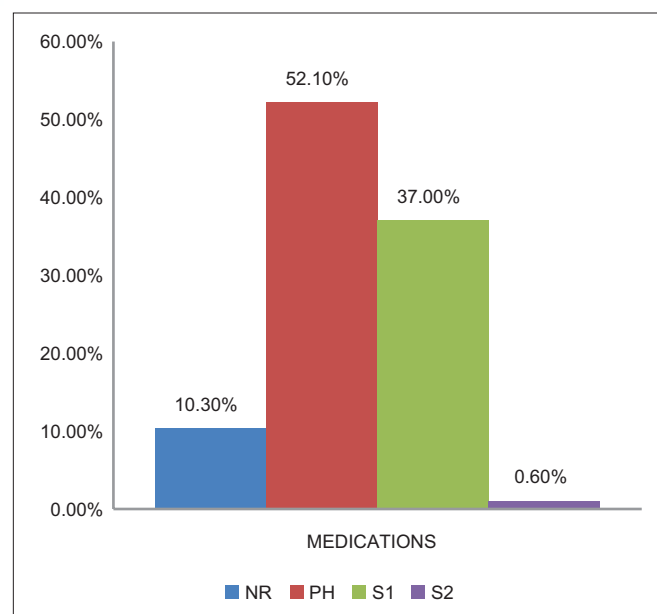
Discussion

Hypertension is an important public health challenge worldwide because of its high prevalence and being the most important modifiable risk factor for cardiovascular, cerebrovascular, and renal diseases. Dental care professionals realize that the key component of any dental treatment is patient assessment. Several studies have shown that dental care professionals can play an important role in a patient's overall health by measuring BP, potentially identifying undetected or uncontrolled hypertension.

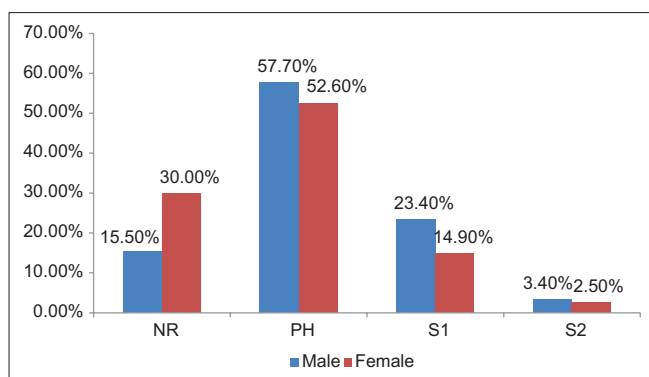
The present study was conducted to investigate the prevalence of undiagnosed hypertension as well as inadequately controlled BP among general population.

The prevalence of hypertension in our study (23.2%) is similar to the study done by Ojehanon and Akhionbare^[7] (19.7%), Fernández-Feijoo *et al.*^[5] (29.2%), and Tormo *et al.*^[8] (34.3%). This explains the higher prevalence of hypertension observed in our sample.

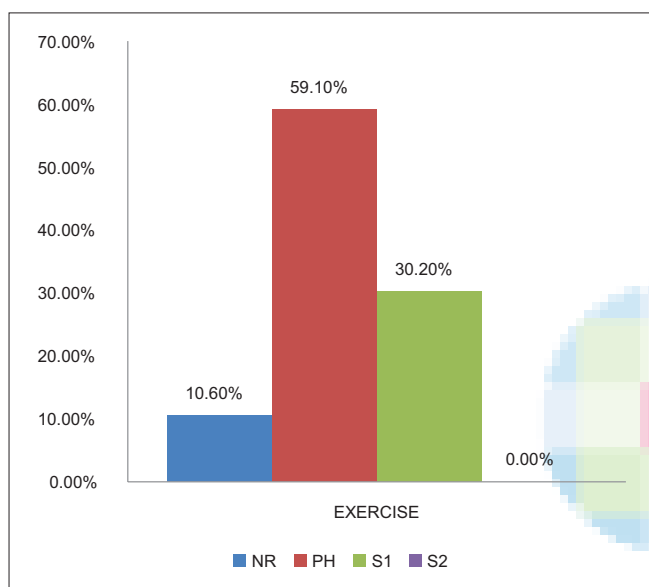
Our study reflects that a significant number of patients were unaware of being hypertensive. These patients possess a higher risk of prolonged heavy bleeding and developing medical emergencies in the dental clinic. This emphasizes the importance of screening of hypertension in the dental office. These patients were referred to a physician for further management.



Graph 2: Among the patients who were found to have various systemic disorders as mentioned in the questionnaire and were taking medications for the same, a large number of them were found to be in prehypertensive stage (52.10%), followed by 37% of patients who were recorded under Stage 1 hypertension



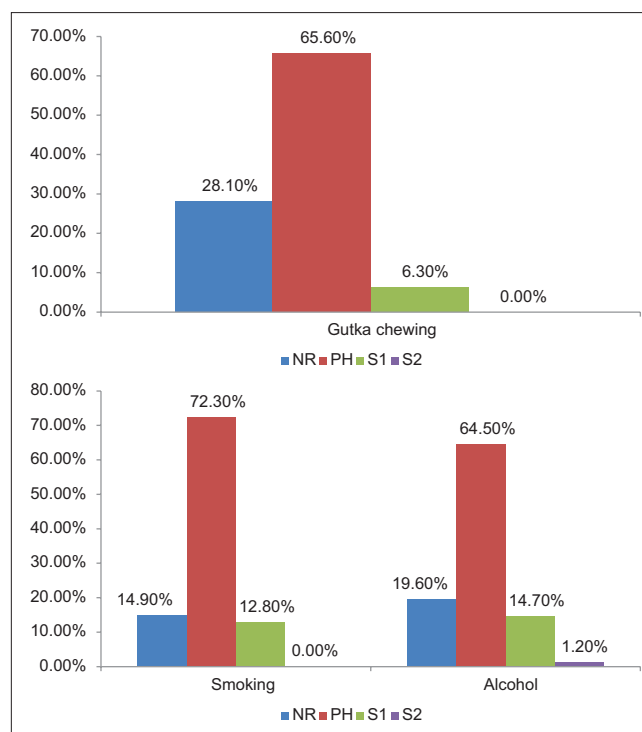
Graph 3: The effect of gender on blood pressure was evaluated, and it was found that majority of male patients were in prehypertensive stage (57.7% males and 52.6% females)



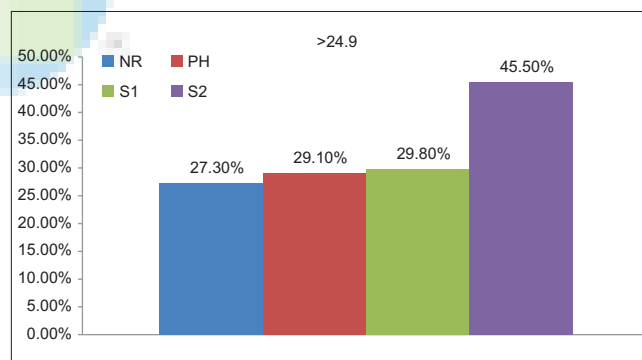
Graph 5: Among the patients who exercised on a regular basis, majority of them were found to be in prehypertensive stage followed by Stage 1 hypertension

In the present study, increasing age was significantly related to BP levels [Table 2 and 3, Graph 1]. Increase in BP with age is mostly related to changes in arterial and arteriolar stiffness. Other pathophysiological influencing factors which contribute to the increase in BP include decreased baroreceptor sensitivity, increased responsiveness to sympathetic nervous system stimuli, altered renal sodium metabolism, and an altered renin–aldosterone relationship.^[9] This combined with the fact that elderly patients often present with comorbidities, indicating that the combination of age and high BP may be the most important medical risk factor in patients undergoing dental treatment.^[10]

When a comparison was made between male and female patients, it was found that the number of male patients exceeded female patients in Stage 1 and Stage 2 hypertension. The prevalence of prehypertension was more in female patients [Graph 3]. This finding could be



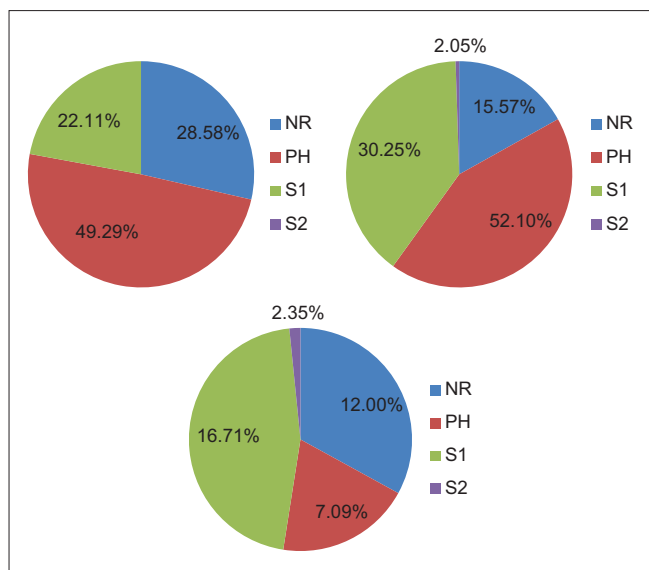
Graph 4: Blood pressure of patients with different habits such as gutka chewing, smoking, and alcohol was compared to assess the relationship of the habit and the hypertension. It was observed that for all the habits, maximum patients were found in prehypertensive stage, but smokers outnumbered the other patients in having high blood pressure. This shows that of all the habits, patients who are smokers have the maximum chances of acquiring hypertension



Graph 6: Nearly 45.5% of patients with body mass index >24.9 were found to be in the stage 2 hypertension

attributed to more number of female patients in the sample size. This is in accordance with studies done by Lei *et al.*^[11] Observed gender differences in hypertension which exist in humans are due to both biological and behavioral factors.^[12] The biological factors include sex hormones, chromosomal differences, and other biological sex differences that are protective against hypertension in women.

Cigarette smoking is a powerful cardiovascular risk factor as it can cause impairment of endothelial function, arterial stiffness, inflammation, lipid modification, as well as an alteration of antithrombotic and prothrombotic factors. Cigarette smoking acutely exerts a hypertensive



Graph 7: Blood pressure was increased after administering local anesthesia (2% lignocaine with adrenaline 1:80,000). Mean basal blood pressure before and after administering local anesthesia was 16.71% in Stage 1 category, 12% in the normal category, 7.09% in stage prehypertension, and 2.35% in Stage 2 category

effect, mainly through the stimulation of the sympathetic nervous system.^[13] This explains the high prevalence of hypertension in smokers in our study [Graph 4].

The regular practice of physical exercises promotes important autonomic and hemodynamic adaptations that influence the cardiovascular system. Several population studies have indicated that the practice of moderate physical activity reduces the future risk of high BP and its progression.^[5] In our study, a statistically significant relationship could not be established for between hypertension and exercise [Graph 5]. Several studies have indicated that regular physical exercises are inversely proportional to cardiovascular mortality in long term. Moderate exercise reduces the risk of hypertension and its progression.

Body mass index (BMI), calculated as weight in kilogram/height in meters², is most widely used to estimate the prevalence of obesity within a population. The positive association of BMI and BP has been reported among Asian population. The present study is in agreement with the findings of literature.^[14] Nearly 45.5% of patients with BMI >24.9 were found to be in Stage 2 hypertension [Graph 6].

A mild increase in BP was observed after administering local anesthesia [Table 4, Graph 7]. It could be attributed to the sensitivity of alpha receptors in vessels supplying the skeletal muscles to epinephrine. Anxiety and white coat hypertension phenomena could be other reasons for increase in BP on the dental chair while receiving local anesthetic injection.

Some studies have observed fall in systolic BP after administration of local anesthesia,^[15] which is in contrast to the present study. Adverse cardiovascular system

responses to epinephrine contained in local anesthesia solution may not be detectable if the BP is not recorded continuously. In controlled hypertensive patients who are on antihypertensive medications, the BP and cardiac output may not be accurately measured because of the interaction between the medication and epinephrine.

Dental health-care providers should be more aware of managing a hypertensive patient in the dental office. Stress reduction protocols should be followed before, during, and after dental treatment.

Conclusion

The study observes the prevalence of undiagnosed as well as inadequately controlled hypertension among general population. It emphasizes that all dentists should practice monitoring BP of all patients, especially those undergoing extractions to prevent life-threatening complications of this silent killer disease worldwide. It also makes patients aware about their BP at an early age and also about their inadequately controlled BP (if there are associated risk factors such as being overweight or habits such as smoking) to facilitate its control and reduce morbidity and mortality. Funded by Army College Of Dental Sciences.

Any negligence can lead to prolonged bleeding and developing of a medical emergency in the dental clinic.

Relevance of study

The new cases of hypertension indicate that substantial efforts are needed to achieve effective prevention and control of hypertension in a dental office to prevent life-threatening complications.

Financial support and sponsorship

Funded by Army College of Dental Sciences, Secunderabad.

Conflicts of interest

There are no conflicts of interest.

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