

Prevalence of undiagnosed hypertension amongst dental patients in the University College Hospital, Ibadan Oyo State, Nigeria

Występowanie niezdiagnozowanego nadciśnienia u pacjentów w trakcie leczenia stomatologicznego w Szpitalu Uniwersyteckim w Ibadan w Nigerii

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Abstract

Introduction. 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. **Aim of the study.** To determine the prevalence of undiagnosed hypertension and the level of control in diagnosed hypertensive patients presenting at a dental outpatient clinic in Nigeria. **Material and methods.** A cross-sectional survey of patients presenting at the Dental Outpatient Clinic of a Nigerian tertiary hospital 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, with 107 (19.4%) previously on antihypertensive drugs but only 14 (13.0%) on an 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

Streszczenie

Wstęp. Nadciśnienie jest jednym z istotniejszych stanów chorobowych podczas leczenia stomatologicznego. Może pojawić się w sposób doraźny podczas leczenia lub spowodować jego modyfikację. **Cel pracy.** Ustalenie częstości występowania niezdiagnozowanego nadciśnienia i skuteczności jego monitorowania u pacjentów ze zdiagnozowanym ciśnieniem zgłaszających się do ambulatoryjnego leczenia stomatologicznego w Nigerii. **Material i metody.** Przeprowadzono przekrojowe badanie pacjentów zgłaszających się do leczenia ambulatoryjnego. Po wyrażeniu zgody mierzono ciśnienie u pacjentów powyżej 15 roku życia za pomocą elektronicznego ciśnieniomierza. Dokonano analizy porównawczej ciśnienia i wskaźnika masy ciała, nadciśnienia w wywiadzie rodzinnym i statusu społeczno-ekonomicznego. Poziom istotności ustalono dla $p < 0,05$. **Wyniki.** Badaniem objęto łącznie 552 pacjentów, z czego 107 (19,4%) przyjmowało leki obniżające ciśnienie, ale z nich tylko 14 (13,0%) wykazywało prawidłowe ciśnienie. Kolejnych 41 pacjentów (9,2%) miało nadciśnienie nie będąc tego świadomym. Stwierdzono statystycznie istotną zależność pomiędzy nadciśnieniem potwierdzonym w wywiadzie rodzinnym a wysokim ciśnieniem

KEYWORDS:

prevalence, hypertension, undiagnosed, dental, outpatient

HASŁA INDEKSOWE:

występowanie, nadciśnienie, niezdiagnozowany, stomatologiczny, ambulatoryjny

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 in the early detection of hypertension. Also patients' opinion of their blood pressure may be insufficient for optimal dental management.

Introduction

Hypertension is one of the most common chronic medical disorders¹ 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 deaths are attributable to suboptimal blood pressure control.^{1,2} Hypertension is quite common in the West African region, where there are scarce resources to manage it and the procedure for detection is haphazard.^{3,4} In Nigeria, hypertension and its complications account for about 25% of emergency hospital admissions.⁵ It is the most frequently diagnosed medical condition in elderly Nigerians and the most common condition associated with dementia as well as the most common cause of sudden unexpected natural death.⁵ Hypertension is the most common cardiovascular disease in Nigeria and an important cause of disability.^{5,6}

Hypertensive patients presenting at the dental clinic can be divided into three groups: the undetected, non-compliant and controlled hypertensive.⁷ These three groups of patients are of great importance to the dental profession because their management – without being cognizant of their status or medication – may further jeopardize their health. Dental management of controlled hypertensive patients requires optimal pain control, stress and anxiety reduction to prevent hypertensive crisis.⁷ 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 loss of vision.⁸ Dental treatment must therefore be deferred in cases of 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 a hypertensive episode.⁹ Despite the importance of hypertension in dental treatment, only a few dentists check their patients' blood pressure before dental procedures.¹⁰ In a study by Greenwood and Lowry,¹⁰ about 82.1% of the assessed dentists had equipment capable of measuring blood pressure, but only 4.8% of them measure blood pressure routinely, with the percentage increasing to 9.2% when assessing patients that are known hypertensive cases.¹⁰ This study aimed at assessing the prevalence of high blood pressure among dental out-patients and levels of monitoring blood pressure of patients with a previous diagnosis of hypertension at the Dental Centre, University College Hospital, Ibadan, Nigeria.

rozkruczowym. Potwierdzono kolejną istotną statystycznie zależność między ciśnieniem krwi a wiekiem ($p < 0,05$). **Wniosek.** W badaniu wykazano, że pacjenci z nadciśnieniem stanowią istotny odsetek ogólnej liczby pacjentów stomatologicznych. Wynika z tego, że lekarze dentyści mają wyjątkową szansę wczesnego wykrycia nadciśnienia. Również subiektywne odczucie pacjentów poziomu ciśnienia może być niedostateczne dla zapewnienia optymalnego leczenia stomatologicznego.

Material and methods

A cross-sectional survey of 552 patients presenting at the Dental Out-Patient Clinic of the University College Hospital, Ibadan, Nigeria was undertaken as part of a bigger study. The consent of each patient was sought after explaining the necessary details of the study and consenting patients above 15 years of age were recruited into the study. The blood pressure of each of the subjects was measured with the aid of a digital sphygmomanometer (Omron®) after the subject

had been seating quietly on a chair for at least five 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. Use of caffeine, physical exercise and smoking within thirty 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.*, 2003¹¹ as follows:

BP Classification	Systolic BP (mm Hg)	Diastolic BP (mm Hg)
Normal	< 120	and < 80
Pre-hypertension	120–139	or 80–89
Stage 1 hypertension	140–159	or 90–99
Stage 2 hypertension	≥ 160	or ≥ 100

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

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

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. 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

Data were analysed with SPSS windows version 14.0 (SPSS Inc. 2005). Level of statistical significance was set at $p < 0.05$. Ethical approval was obtained from the university of Ibadan and University College Hospital ethical review committee (UI/UCH IRC) before the commencement of the study.

Results

A total of 552 subjects consisting of 255 (46.2%) males and 297 (53.8%) females 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. Their blood pressure ranged from 82 to 210 mm Hg systolic blood pressure (SBP) and 45 to 120 mm Hg diastolic blood pressure (DBP). 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 (Fig. 1). The prevalence of hypertension is thus 15.7% SBP and 17.4% DBP. The blood pressure tends to increase with the age of the subjects, as only one of those younger than 20 years had systolic blood pressure in the range of Stage 1 hypertension and none in Stage 2 either for systolic or diastolic blood pressure. There was a statistically significant relationship between age and blood pressure ($p < 0.000$) (Table 1). The mean blood pressure also tends to increase with the subjects' age, and this was steeper with the diastolic rather than the systolic blood pressure (Table 2).

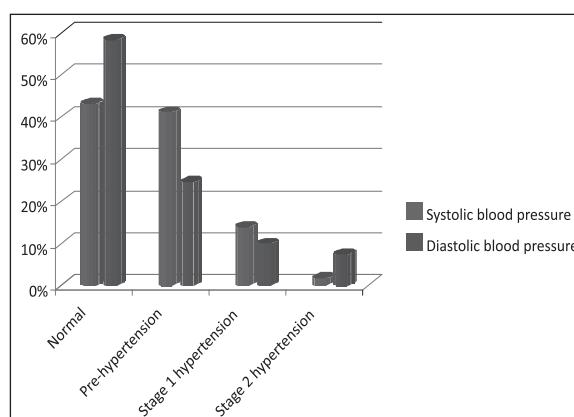


Fig. 1. Distribution of blood pressure of subjects.

Table 1. Comparative analysis of blood pressure of the subjects according to their age range

		Age range (%)						Total
		< 20	20-29	30-39	40-49	50-59	> 60	
Normal blood pressure	Systolic	5 (62.5)	81 (68.6)	71 (47.3)	49 (41.2)	18 (23.7)	14 (17.3)	238
	Diastolic	7 (87.5)	91 (77.1)	93 (62.0)	57 (47.9)	33 (43.4)	40 (49.4)	321
Pre-hypertension	Systolic	2 (25.0)	35 (29.7)	62 (41.3)	56 (47.0)	36 (47.4)	36 (44.4)	227
	Diastolic	1 (12.5)	21 (17.8)	34 (22.7)	43 (36.1)	20 (26.3)	16 (19.8)	135
Stage 1 hypertension	Systolic	1 (12.5)	2 (1.7)	16 (10.7)	14 (11.8)	20 (26.3)	24 (29.6)	77
	Diastolic	0	4 (3.4)	12 (8.0)	13 (10.9)	14 (18.4)	12 (14.8)	55
Stage 2 hypertension	Systolic	0	0	1 (0.7)	0	2 (2.6)	7 (8.7)	10
	Diastolic	0	2 (1.7)	11 (7.3)	6 (5.1)	9 (11.9)	13 (16.0)	41
Total		8	118	150	119	76	81	552

Diastolic B.P: p = 0.000, Systolic B.P: p = 0.000.

Table 2. Distribution of mean blood pressure according to the age group of the subjects

	Number (%)	Systolic Blood Pressure (mm Hg)		Diastolic Blood Pressure (mm Hg)	
		Mean	SD	Mean	SD
< 20	8 (1.4)	115.8	14.6	62.4	10.6
20 – 29	118 (21.4)	112.7	11.3	70.9	10.1
30 – 39	150 (27.2)	119.5	14.0	75.6	13.0
40 – 49	119 (21.5)	122.3	14.2	79.6	11.3
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

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 their blood pressure was still suboptimal. 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. This gives a prevalence of 9.2% for previously undiagnosed hypertension. There was a statistically significant relationship between past history of hypertension and elevated blood pressure in this study (p = 0.000) (Table 3).

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

Table 3. Comparative analysis of past history of hypertension and gender of respondents with their systolic blood pressure

		Past history of hypertension		Gender		Total (%)
		Yes (%)	No (%)	Male (%)	Female (%)	
Systolic blood pressure	Normal	14 (13.0)	224 (50.5)	94 (36.9)	144 (48.5)	238 (100)
	Pre-hypertension	48 (44.4)	179 (40.3)	126 (49.4)	101 (34.0)	227 (100)
	Stage 1 hypertension	40 (37.0)	37 (8.3)	27 (10.6)	50 (16.8)	77 (100)
	Stage 2 hypertension	6 (5.6)	4 (0.9)	8 (3.1)	2 (0.7)	10 (100)
Total		108 (100)	444 (100)	255 (100)	297 (100)	552 (100)

(Past history of hypertension $p < 0.000$); (Gender $p < 0.000$).

Table 4. Comparative analysis of the systolic blood pressure of subjects with their body mass index

		Body Mass Index			Total (%)
		Underweight (%)	Normal weight (%)	Overweight (%)	
Systolic Blood Pressure	Normal	15 (83.3)	165 (45.6)	58 (33.7)	238 (43.1)
	Pre-hypertension	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)

($p = 0.002$)

pressure within the range of Stage 1 hypertension. This was statistically significant ($p < 0.000$) (Table 3). Among those considered to be overweight, 58 (33.7%) had normal blood pressure, 30 (17.4%) had their blood pressure within Stage 1 hypertension. There was a statistically significant relationship between the body mass index and systolic blood pressure ($p < 0.002$) (Table 4). 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 Stage 1 SBP. There was a statistically significant difference when the socioeconomic status of the respondents was compared with their systolic blood pressure ($p < 0.0001$) and diastolic blood pressure ($p < 0.023$).

Discussion

In this study, the blood pressure of subjects ranged from 82 to 210 mmHg systolic blood pressure (SBP) and 45 to 120 mmHg diastolic blood pressure (DBP), which is lower than that from the study by *Kellogg* and *Gobetti* 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.^{11,15,16} 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 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 similarly to 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;²⁰ other frequently observed complications include diastolic dysfunction, seizures, urinary albumin excretion and arteriosclerosis.^{18,20,21} High incidence of complications in young hypertensive patients may be due to the asymptomatic nature of elevated blood pressure in the early stages coupled with paucity of screening for hypertension in the paediatric population.^{18,19} This often leads to a situation when that majority of diagnosed cases are those with clinical cardiovascular disease.

Apart from one subject, all those that had prior knowledge of their hypertensive status claimed that their blood pressures were well controlled; however, objective assessment proved otherwise because 42.6% of these subjects had elevated blood pressure. Poor compliance with treatment has been identified as the most important cause of uncontrolled blood pressure and compliance is a big problem in the management of chronic diseases.^{2,6} Poor knowledge of the nature of hypertension is an important cause of poor compliance because some consider the use of medications unnecessary once they begin to 'feel well'; others are worried about the potential side effect of prolonged drug therapy.^{2,22} Other reasons associated with poor compliance include poverty, cost of transportation to medical centres, cost of drugs, cost of hospital

consultation, overemphasis on side effects of drugs, complex treatment regimen, poor social support network and a belief that a cure has been achieved once symptoms have subsided.^{2,23} Hypertensive patients must be educated about the nature of the disease, they must know that lifelong management is paramount, be made aware of the complications that follow poor compliance and be provided with adequate information to reduce the fear and anxiety associated with prolonged use of anti-hypertensives.^{6,24}

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 who 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 Gobetti¹⁴ who reported that 77 (18.5%) of the 417 that were previously not diagnosed as being hypertensive had elevated blood pressure. This difference could have been a result of differences in the geographical location, socioeconomic status and diet of the people considered in the two studies. This becomes more obvious as the finding in this study is more closely related with another Nigerian study that reported a prevalence of 10.3% for previously undiagnosed hypertension among some dental patients.²⁹ Considering the high prevalence of hypertension in our modern world and its importance to patients' well being, quality of life and successful dental management, the dental profession must play a more active role in the early detection of elevated blood pressure.^{16,30}

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. For example, eight (2.2%) of those that had normal weight were in the JNC Stage 2 hypertension in comparison with only 2 (1.2%) of those that were overweight. This is contrary to expectation but BMI is just one of the risk factors for hypertension, other equally important factors including hyperlipidemia, sedentary life style, diabetes mellitus and genetic factors.^{16,24} Hypertension is more prevalent in males than females before menopause, which had been attributed to the cardiovascular protective effects of estrogen.^{31,32} Surprisingly, in the present study, a greater percentage of women (17.3%) were hypertensive compared to males (13.7%) irrespective of age. This is at variance with the study findings by *Kellogg and Gobetti*,¹⁴ in which it was reported that more males were hypertensive among the younger age groups, a trend that is reversed among the older age groups, with more of the older women being hypertensive. *Pyle et al.*³³ 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.

In conclusion, this study demonstrated that a significant proportion of patients presenting at the dental clinic of the University College Hospital Ibadan have high blood pressure. Some of these patients were unaware of their health status, while others are of the opinion that their blood pressure is being controlled by antihypertensive drugs. Thus, a unique opportunity is presented to the dental profession to be more active in the early detection of hypertension, and hence play an important role in reducing its morbidity and mortality. Studies have shown that early detection and management of hypertension is associated with as much as 30% reduction in the risk of cardiovascular disease and death; otherwise, hypertension, even in its mild form is a progressive and lethal disease if left untreated.^{7,14} 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 and pre- and post-invasive dental treatments.

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