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ORIGINAL ARTICLE

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Prehypertension and undiagnosed hypertension in a sample of dental school female patients

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Abstract: *Objective:* This study was conducted to assess prevalence of hypertension and prehypertension in a sample of female dental patients. *Methods:* A total of 208 consecutive female patients aged ≥ 18 years provided information about sociodemographics, history of hypertension and other systemic diseases, antihypertension medication use and smoking history. Two blood pressure measurements were taken by a dentist and the average measurement was utilized in the present analysis. *Results:* The mean age of the study sample was 38 (±13) years. Thirty-seven per cent of the sample had prehypertension (ranging between 120/80 and 139/89 mmHg). High blood pressure (HBP) measurement (≥140/90 mmHg) was recorded on 18% of the study population. Of those, 66% were unaware of their HBP prior to their dental visit (represent 12% of the study sample). The mean systolic and diastolic blood pressure of those with elevated blood pressure were 154 (±16) and 94 (±12), respectively. Furthermore, 26% of those 30 years of age or older had HBP measurements. History of hypertension was reported by 13% of the study sample. Of those, 48% had HBP measurement. The use of antihypertension medications was reported by 10%. *Conclusions:* There is a high prevalence of undiagnosed hypertension and prehypertension in the present sample. These results underscore the importance of routine blood pressure measurements in the dental clinics.

Key words: dental patients; high blood pressure; hypertension; prehypertension; Saudi Arabia

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Introduction

Hypertension is one of the most common chronic conditions affecting about 26% of the adult population worldwide (1). According to the World Health Organization 2002 report, 62% of cerebrovascular disease and 49% of ischaemic heart disease are attributable to suboptimal blood pressure (2). Furthermore, hypertension is considered a major risk factor for mortality causing about 13% of the total death worldwide (2).

Based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7), prehypertension is defined as blood pressure between 120/80 and 139/89 mmHg (3). Prehypertension is not a disease category but rather a risk factor for developing hypertension and is associated with increased risk of major cardiovascular events, independent of other cardiovascular risk factors (3, 4). It is linked to greater arterial intima-media thickness and elevated rates of cardiac dysfunction (5, 6). Furthermore, prehypertension has been suggested to increase the risk of cardiovascular disease progression (7, 8). Individuals who are prehypertensive are not candidates for pharmacological therapies but should be advised to practise healthy lifestyle to minimize their potential risk of developing hypertension (3).

In Saudi Arabia, prevalence of hypertension and prehypertension is increasing affecting about 25% and 43% of the adult Saudi population, respectively (9, 10). In a recent study in Saudi dental patients, history of hypertension was reported by only 6.7% of the studied sample and this lower prevalence was attributed in part to the possibility that some patients may have undiagnosed hypertension (11). In two studies among dental school patients in the US and in Japan, 49% and 20%, respectively, of persons with high blood pressure (HBP) were not aware of their condition prior to their dental visit (12, 13).

The early detection and treatment of individuals who have HBP is important in order to avoid or minimize significant complications of hypertension. Moreover, detecting dental patients with HBP can prevent potential life-threatening complications by avoiding dental treatment of those with severe HBP before control of their hypertension (14).

The objective of this study was to assess prevalence of hypertension and prehypertension among female patients presented for treatment at the female dental clinics of King Abdulaziz University, Faculty of Dentistry (KAUFD) in Saudi Arabia.

Study population and methods

This is a cross-sectional study conducted at KAUFD in the western part of Saudi Arabia. Study participants were selected from patients presented for treatment at KAUFD-female section where only female patients are treated. A total of 208 consecutive female patients aged ≥18 years who voluntary consented to participate in the study were included. Information about sociodemographics, history of hypertension and other systemic diseases, antihypertension medication use and smoking history were obtained from all participants. Two blood pressure measurements, 5 min apart, on right and left arms were taken by a dentist using an electric sphygmomanometer (OMRON, HEM-775, Omron Healthcare Inc., Bannockburn, IL, USA) and the average measurement was utilized in the present analysis. The JNC7 criteria were used for blood pressure classification (3). Patients with blood pressures between 120 and 139 mmHg systolic or 80 and 89 diastolic were considered to have prehypertension; those with 140–159 mmHg systolic or 90–99 diastolic were classified as having stage I hypertension; and those with ≥160 mmHg systolic or ≥100 diastolic blood pressure were classified as having stage II hypertension. Data were analyzed utilizing a statistical package for social science (SPSS, version 16, SPSS Inc., Chicago, IL, USA). Means and frequency distributions were calculated for continuous and categorical variables, respectively. To examine the possible association between HBP and socio-demographic variables, Chi-square test was used. The mean systolic and diastolic blood pressure were calculated and compared across characteristics of the study sample using independent sample *t*-test or one-way ANOVA and $P < 0.05$ was considered statistically significant.

Results

The mean age of the participants was 38 (±13) years. As shown in Table 1, more than 42% of the studied sample were 41 years of age or older. About 57% of the participants did not complete the high school education. Only about 5% of the sample were former or current smokers. History of diabetes and hypertension was reported by about 11% and 13% of the subjects, respectively. The mean systolic and diastolic blood pressure was statistically significant across the categories of age, and history of hypertension and diabetes.

In the total study sample, the mean systolic and diastolic blood pressure were 124.9 (±17.8) and 76.2 (±12.5). Based on the left arm measurements, the mean systolic and diastolic blood pressure were 123.8 (±19.9) and 75.3 (±13.5), respectively. Whereas based on the right arm measurements, these figures were 126.1 (±17.4) and 77.2 (±13.0), respectively. The left and right arms systolic and diastolic blood pressure measurements were highly correlated (0.86 and 0.80, respectively,

Table 1. **Characteristics of the study sample and mean systolic and diastolic blood pressure**

Variables		*n*	(%)	Systolic	Diastolic
Age (years)	18–30	77	37.0	116.6 (12.9)	71.8 (10.5)
	31–40	43	20.7	123.5 (19.1)	77.1 (13.6)
	41–50	55	26.4	131.5 (19.1)	80.2 (12.8)
	>50	33	15.9	135.3 (15.9)***	78.8 (12.2)***
Education	Illiterate	46	22.1	132.0 (16.2)	79.3 (11.4)
	<HS	73	35.1	126.0 (18.7)	76.8 (13.3)
	≥HS	89	42.8	120.4 (17.1)**	74.2 (12.1)
Smoking	Current	3	1.4	124.2 (13.6)	74.8 (10.6)
	Former	7	3.4	126.4 (13.5)	74.8 (10.9)
	Never	198	95.2	124.9 (18.2)	76.3 (12.6)
History of diabetes	No	186	89.4	123.2 (17.3)	75.4 (12.4)
	Yes	22	10.6	139.9 (17.3)**	83.1 (11.7)***
History of hypertension	No	181	87.0	123.6 (16.9)	75.0 (11.8)
	Yes	27	13.0	138.3 (19.5)***	84.7 (13.9)***
Use of antihypertensive medications	No	187	89.9	123.6 (17.8)	75.7 (12.6)
	Yes	21	10.1	137.8 (14.8)**	81.6 (10.2)*
History of other diseases	No	140	67.3	125.0 (18.5)	76.4 (13.1)
	Yes	68	32.7	124.8 (16.9)	76.0 (11.4)
	Total	208	100		

HS, high school education.
*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

$P = 0.000$). The prevalence of prehypertension, stage I and stage II hypertension based on the average measurements of the two readings were 37%, 12% and 6%, respectively. As shown in Fig. 1, prevalence of hypertension and prehypertension is increased by increasing age ($P < 0.001$). Only about 5% of the participants aged 18–30 years had hypertension, whereas this prevalence is increased to 39% among subject 51 years of age or older. High and pre-HBP were more frequent among diabetics and those with history of hypertension (Figs 2 and 3). More than 48% of those with history of hypertension had HBP measurements, whereas only about 14% of those without history of hypertension had HBP measurement ($P < 0.001$). Among diabetics, HBP was recorded on about 50% of the subjects; whereas only about 15% of non-diabetics had HBP measurements ($P < 0.001$).

Discussion

This is a cross-sectional study evaluating blood pressure of 208 female patients presented for treatment at a dental school in Saudi Arabia. Eighteen per cent of the sample and 26% of those aged ≥30 years had elevated blood pressure. These results are consistent with the findings of a recent nationally representative sample of adults 30–70 years old in Saudi Arabia, in which 24% of female participants had elevated blood pressure (9).

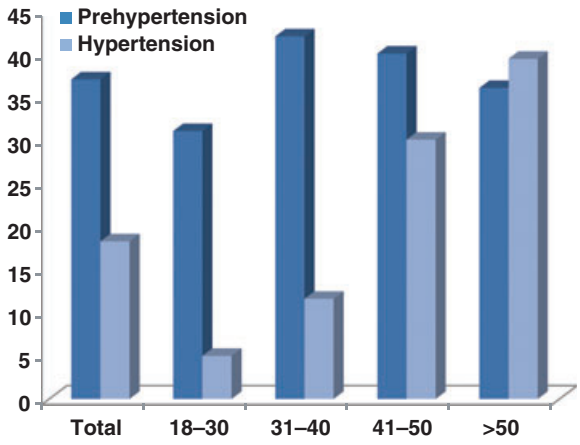

Fig. 1. Prevalence of prehypertension and hypertension in the total sample and stratified by age.

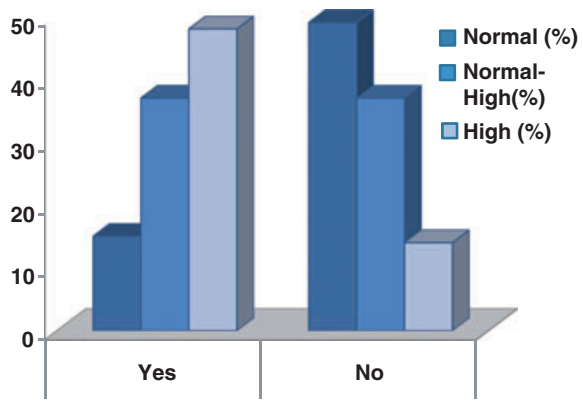

Fig. 2. Prevalence of high blood pressure stratified by history of hypertension.

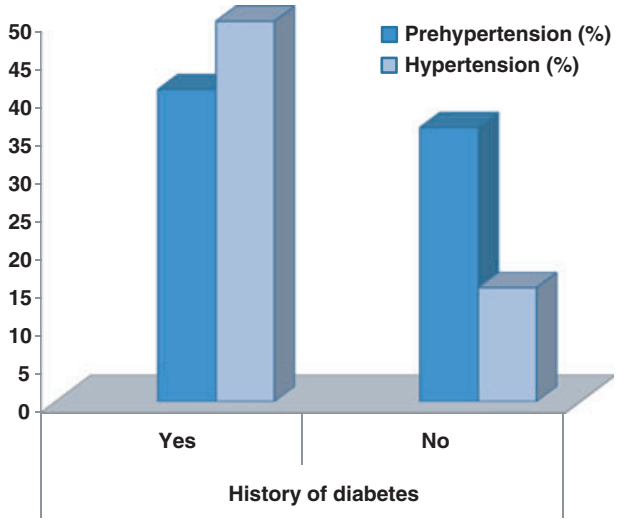

Fig. 3. Prevalence of prehypertension and hypertension among diabetics and non-diabetics.

In the present study, 66% of those with HBP were not aware of their condition prior to their dental visits. This is higher than that reported among dental patients in the US and in Japan (12, 13), which could be an indication of the lower health awareness in the present sample. Moreover, almost half of those with history of hypertension had elevated blood pressure. It is important to note, however, that a confirmed diagnosis of hypertension cannot be made based on measurements taken on a single visit. It must be made based on the average of two or more readings taken at two or more visits after an initial screening, which is generally made by a Physician. Because dental procedures is known to be associated with anxiety and may result in an increased blood pressures levels (15, 16), it is possible that some of the participants in the present study had temporary blood pressure elevation as a result of their presence in the dental office. Patients suffering this temporary elevation in blood pressure, however, may have cardiovascular abnormalities comparable to those found in diagnosed hypertensive patients (17, 18). Thus, these patients with anxiety-induced HBP might be at risk of the consequences of hypertension similar to an uncontrolled known hypertensive patient (19).

About 37% of women in the current study were classified as prehypertensives. Thus, more than half of the present sample were hypertensive or prehypertensive and more likely would benefit from their referral to a primary care physician. Dentists need to utilize routine dental visits to assess and ensure optimum patients' overall health through proper screening, diagnosis and referral (20). Although measuring blood pressure is recommended for all new dental patients, this is not always a routine practise in the dental clinics (14). Pyle *et al.* in a survey of community-based practising dentists in the US, reported that screening of the blood pressure in new patients with either a history or risk factors for hypertension was not completed by 36% of the respondents and measuring blood pressure for new patients under the age of 30 was not performed by 74% of the respondents (21). Among dental hygienists, a recent study found that only 15% routinely assess blood pressure whereas most of the participants (55%) rarely or never recorded the blood pressure (22). Thus, many of the dental patients at greater risk of hypertension complications may not be screened or evaluated in the dental clinics.

In conclusion, the results of this study suggest a high prevalence of prehypertension and undiagnosed hypertension among dental patients. Dental health professionals must routinely screen their patients for HBP and need to be more actively involved in raising awareness of hypertension among their dental patients. Moreover, healthcare systems need to offer easily accessible screening clinics and affordable therapies for management of hypertension.

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