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Original Article

The Screening of Hypertension in a Dental School: An insight into Dentist Role and Patients Drug Adherence. A Cross-Sectional Study

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Abstract:

Objectives: We aim to screen the hypertension prevalence in a dental school in Egypt. Meanwhile, we aim to evaluate the role of dentist in early detection of hypertension and to investigate the patients' adherence toward anti-hypertensive drugs.
Materials and Methods: A cross-sectional study. The study was conducted at the Diagnostic Center, Faculty of Dentistry, Cairo University, Cairo, Egypt. This clinic carries out the overwhelming part of the dental care in Egypt. All the patients aged 18 and older who admitted to the Diagnostic Center had their blood pressure measured before the dental examination. Blood pressure diagnosis was based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommendations using an automatic blood pressure reading device (Omron M4®). Patients with elevated blood pressure were scheduled for a second confirmatory measurement. Hypertension prevalence in dental educational hospital.
Results: The overall hypertension prevalence was 17.1 % and the prevalence was 17.4 % in males and 16.9 % in females. 14.9 % of hypertensive patients were not known to be hypertensive and were newly discovered as hypertensive when blood pressure measurement was done. 40.2 % of hypertensive were noncompliant to their antihypertensive medications.
Conclusion: Dental patient screening for hypertension has the potential to benefit public health outcomes, by identifying patients with hypertension, and allowing for earlier intervention.

Keywords: Hypertension, prevalence, Egypt, dental clinic, blood pressure

Introduction:

Hypertension is a highly prevalent disease with a major global health burden due to its cardiovascular and kidney complications. Also, it is considered the leading risk factor for premature death worldwide [1]. It is estimated that 1.39 billion people have hypertension worldwide, [2] and about 26.4 % of adult

Egyptians have hypertension [3]. Hypertension is defined as a persistent elevation of systolic blood pressure higher than 140 mmHg and/or a diastolic blood pressure higher than 90 mmHg [4].

Early detection of hypertension is important in the management. "Hypertension breeds hypertension" means that the earlier hypertension is treated, the better is the outcome. On the other hand, the longer the hypertension persists, the worse is the outcome. [1,3,5]. Only 38 % of hypertensive Egyptians are aware of having hypertension, because it usually has no symptoms [3]. As a consequence, it is recommended to measure blood pressure at all primary care visits for early hypertension detection to avoid its major complications [5]. That is why the American Dental Association recommended the blood pressure measurement to all dental patients as a part of the screening and early hypertension detection [6]. Besides the hypertension complications as a disease, there are some oral side effects resulting from hypertension medications including xerostomia, lichenoid reactions and gingival overgrowth [7-10].

There is no nationwide study evaluating hypertension incidence/prevalence in Egypt since 1993, and there is no study examined hypertension screening in dental clinics in Egypt up to date. We aim to screen the hypertension prevalence in a dental school in Egypt. Meanwhile, we aim to assess the role of dentist in early detection of hypertension and to investigate the patient's adherence toward anti-hypertensive drugs.

Materials and Methods:

Setting: This was a cross sectional study. The blood pressure screening study was conducted at the Diagnostic Center, Faculty of Dentistry, Cairo University, Cairo, Egypt. A prior training and pilot study was conducted. This clinic carries out the overwhelming part of the dental care in Egypt. The dental patients presented to this clinic are representatives of all the Egyptian locations. The research is in agreement with the guidelines of the Helsinki Declaration as revised in 1975.

The research has been revised and approved by the Research Ethics Committee, Faculty of Dentistry, Cairo University. Number 18-5-26.
Patient information is confidential and was used only for the purposes stated in this protocol. Ethical approval ensured anonymity of the participants. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement guidelines during the preparation of this study [11].

Participants: all the patients aged 18 and older who admitted to the Diagnostic Center had their blood pressure measured before the dental examination. All the patients agreed to have their blood pressure measured through a verbal consent after confirming the confidentiality of their data.

Data collection:

Blood pressure measurement was conducted by volunteer dental and medical students who are members of a student activity concerned with hypertension problem. A pre-study re-enforcing training was conducted to all the team members to ensure mastering the blood pressure measurements skills and, patient communication and management. Blood pressure diagnosis was based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) [12]. Patients' disease history and medications were taken in addition to other demographic data. Blood pressure was measured twice in a supine position on the dental chair after a five minutes' rest using an automatic blood pressure reading device (Omron M4®). According to JNC 7 our study considers Hypertension diagnosis as systolic blood pressure more than 140 mmHg

and/or Diastolic blood pressure more than 90 mmHg on the average of two properly measured blood pressure reading on each of two office visits. Those who were found normotensive or known hypertensive were not scheduled for a second reading appointment.

Known hypertensive patients either received immediate referral, referral letter to one of the Cairo University Cardiologists clinics, or just a life style advice. Brochures with information about hypertension nature and complications along with healthy life style advice were distributed. The volunteer students communicated with each patient to ensure that they got the correct message with respect to information concerning hypertension. On the second visit, we considered the newly diagnosed hypertensive patients based upon their particular individual hypertensive status and advised adjusted dental therapy based upon that status. Patients with unknown hypertensive etiology demonstrating a persistent elevation of blood pressure in the two visits were referred to one of the Cardiology clinics at the Cairo University based on the patients' addresses for their convenience and accompanied with a referral letter. A flow chart of the procedure is presented in figure 1.

Sample Size calculation:

Sample size was calculated to determine the proper sample size for the prevalence of hypertension among cases in dental clinics. Reviewing the literature revealed that the prevalence in similar situation has an average of 26.3% ± 2.5%. Accordingly, we needed to survey 510 individuals to be able to achieve 80% power setting the alpha error to 0.05. Sample size calculation was done using StatCalc, Epi Info version 7 for MS Windows, Centers for Disease Control and Prevention (CDC), USA.

Data analysis:

Numerical data were statistically described in terms of mean ± standard deviation (± SD), while categorical data were described in frequencies (number of cases) and percentages. All statistical calculations were done using computer program IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) release 22 for Microsoft Windows.

Results

The study sample was 510 patients with gender representation of 31.6 % male and 68.4 % female. The age of subjects ranged from 18 to 86 years with mean age 37.33 years and SD 14.26. The overall hypertension prevalence was 17.1 % and the prevalence was 17.4 % in males and 16.9 % in females. Table 1 shows that hypertension prevalence increases with age and the prevalence in patients over 60 years was 51.5 %.

14.9 % of hypertensive patients were not known to be hypertensive and were newly discovered as hypertensive when blood pressure measurement was done. 40.2 % of hypertensive were noncompliant with respect to adherence to their antihypertensive medications' regimes. 25.3 % of hypertensive patients gave a history of a previous attack of marked increase of their blood pressure which required visiting the emergency unit. A flow chart of participants is presented in figure 2.

Discussion:

According to a study by Mills et al., in 2010, 31.1% of the adult population worldwide had hypertension. Approximately only half (46.5%) of adults with hypertension were aware of having hypertension. Furthermore, only 36.9% of hypertensive patients had been treated with medication for their elevated blood pressure condition, and only 13.8% had controlled blood pressures.

Table 1: The percentage of hypertensive patients relative to different age groups

	Age Groups			
	18-39	**40-60**	**> 60**	**Total**
Non-Hypertensive	287	120	16	423
	93.5%	70.6%	48.5%	82.9%
Hypertensive	20	50	17	87
	6.5%	29.4%	51.5%	17.1%
Total	307	170	33	510
	100.0%	100.0%	100.0%	100.0%

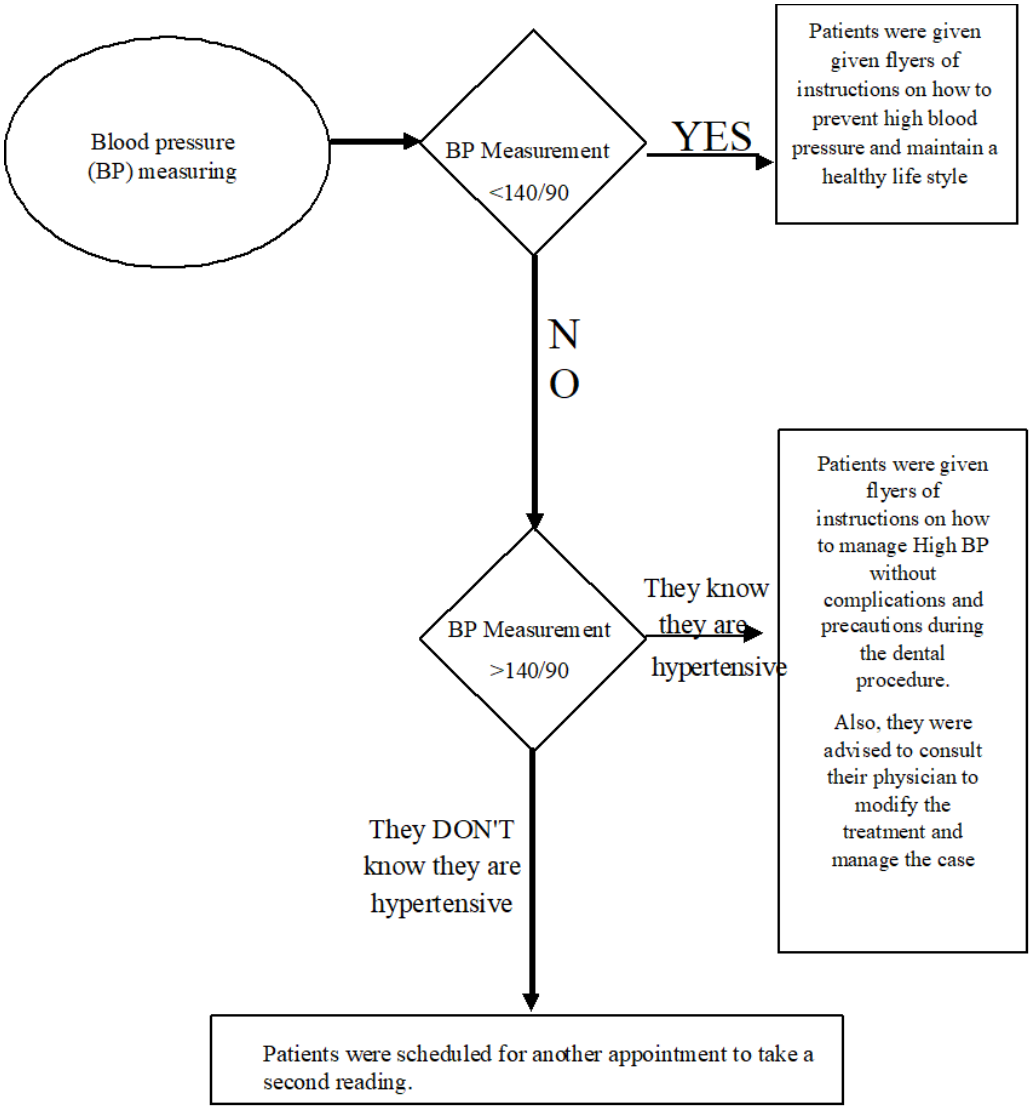

Figure 1: The decision making process during blood pressure measurement

Hypertension awareness and treatment are much lower in low- and middle-income countries compared to high-income countries [2]. Because of the high prevalence of hypertension within the Egyptian population, there is increased economic pressure upon the Egyptian economy. Drug expense is responsible for nearly 80% of the total cost of hypertension care within the first year of treatment. During 2011, the drug cost of hypertension (the total anti-hypertensive market) exceeded one billion Egyptian pounds, and dramatic increase for 600 million Egyptian pounds in 2007 [3].

Greenberg et al., reported with respect to a USA survey that most responding dentists believed that dental screening for medical conditions was worthwhile [13]. Dental screening of medical conditions such as cardiovascular disease and hypertension have been reported favorably also in Saudi Arabia [14, 15], USA [16,17], Nigeria [18,19], Spain [20], Hungary [21], and Sweden [22]. These studies underscore the advantage of monitoring blood pressure in dental clinic settings around the world and supports the importance of blood pressure monitoring both in clinics and in private practice (table 2).

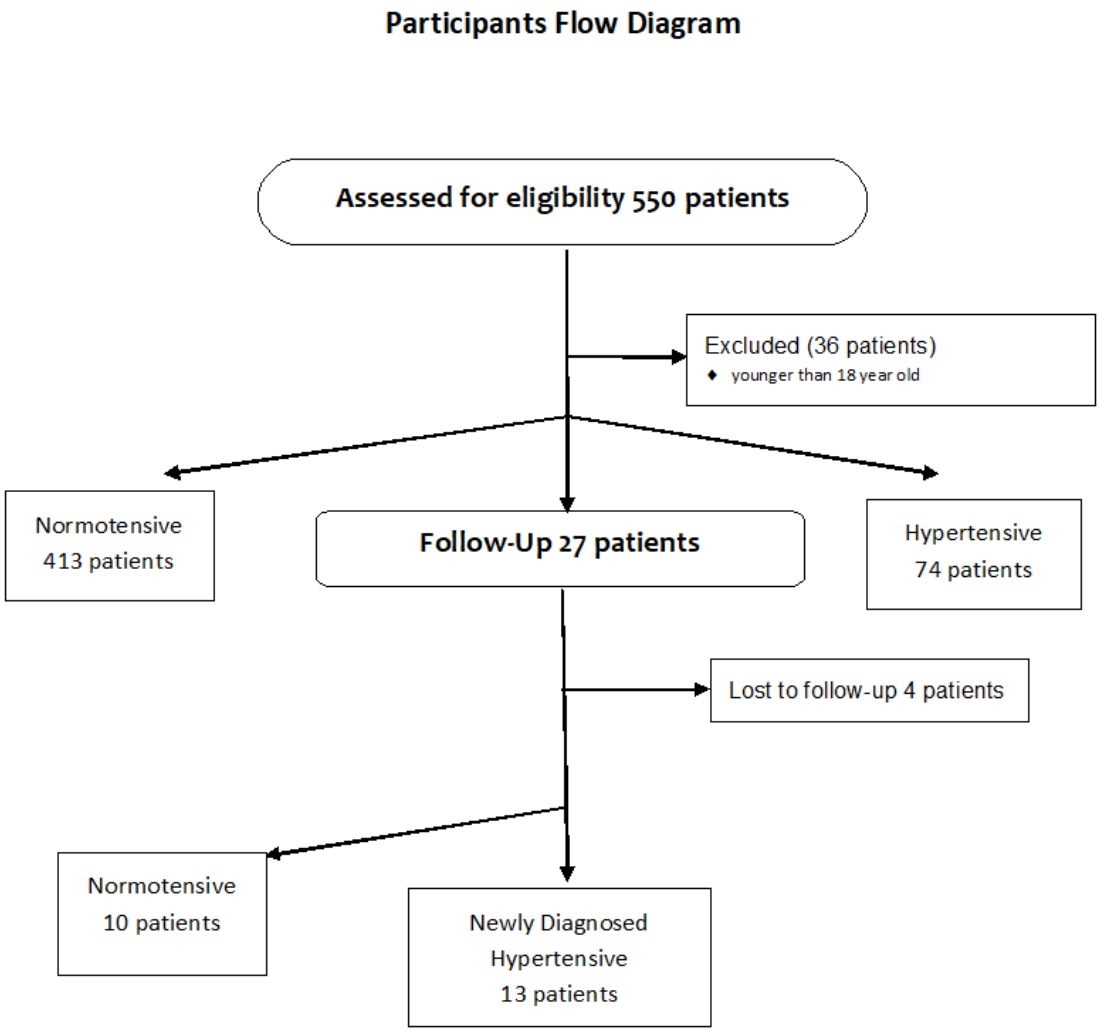

Figure 2: A flowchart summarizing the participants

Table 2: A summary of studies screening hypertensive patients in dental clinics with consideration to the percentage of patients who did not know they already have hypertension before the screening.

Title	ID	Hypertension Incidence	Newly Diagnosed hypertensive Incidence
Early screening of diabetes and hypertension in primary care dental clinics at King Saud University in Riyadh, Kingdom of Saudi Arabia	Hadlaq et al. 2017 Saudi Arabia	44.8%	13.7%
Relevance of routine blood pressure assessment among dental patients in Lagos, Nigeria.	Umeizudike, 2013. Nigeria	prevalence of hypertension was 39.9%	42.1% were previously undiagnosed
Prehypertension and undiagnosed hypertension in a sample of dental school female patients.	Al-Zahrani, 2011. Saudi Arabia	High blood pressure was recorded on 18% of the study population.	66% were unaware of their High BP prior to their dental visit (representing 12% of the study sample).
Efficacy of screening for high blood pressure in dental health care	Egstrom et al., 2011 Sweden	20.6%	8%
Screening for hypertension in a primary care dental clinic	Fernandez-Feijoo et al. 2010 Spain	29.2%	7.8%
Hypertension among dental patients attending tertiary health institution in Edo State, Nigeria.	Ojehanon &, Akhionbare, 2007. Nigeria	prevalence of hypertension among dental patients was 19.7%	10.3 % were unaware of their HBP prior to their dental visit
Hypertension in a dental school patient population.	Kellogg & Gobetti, 2004. USA	32 % of the patients were hypertensive	49 % of whom were unaware of their high blood pressure prior to their dental visit.
The prevalence of hypertension in a dental school patient population.	Gordy et al, 2001. USA	the prevalence of hypertension was 27.9%	40.3 % of whom were unaware of their high blood pressure prior to their dental visit.
Hypertension screening in a dental surgery: a Hungarian study	Bandl et al, 1990. Hungary	24% were found to be hypertensive.	35 % of whom were unaware of their high blood pressure prior to their dental visit.

Creanor et al., reported that in a survey of Southwest England dentists, there was majority support for medical screening. They noted that it was essential to enlist patient acceptance for successful implementation of screening programs [23]. Greenberg and Glick reported that it is important for dentists to monitor and screen for such systemic diseases as hypertension. Dentists see many patients who do not regularly seek medical care, and dental screening can identify at risk patients who may benefit with early detection of hypertension [24]. Laurence reported that dentists consider medical screening important and are willing to incorporate screening procedures into dental practice [25]. Friman et al., agreed that both dentists and dental patients considered hypertensive screening within a dental setting positively. Furthermore, they noted that authorities and organizations also generally had positive views concerning this concept [26].

An intriguing finding of the current study was that 14.9% of the hypertensive screening of patients did not know that they had hypertension. This was a new finding for our study to divide the hypertensive patients into aware or unaware of the disease. This finding emphasizes the importance of screening for medical conditions by dentists.

Another alarming finding was that 40.2% of hypertensive patients were not compliant with their antihypertensive medications placing them at an increased further hypertension risk of complications in Egypt. In a study by Saleem et al, 2012, they interviewed 16 patients in Pakistan and were asked about their current medications and perception toward the treatment. The majority of the patients stated that medications have more adverse effects than the beneficial ones. Others, believed that the long-term use of medications can lead to additional physiological abnormalities in addition to the previous ones. Again, this indicates the role of the dentist in management of hypertension because most of drug side effects are intra oral [27].

Since many hypertensive patients don't seek medical treatment unless they are symptomatic, dentists have a responsibility to screen blood pressure and then refer patients with high blood pressure screening values for further medical evaluation and possible intervention. Also, due to the nature of dental treatment which usually requires multiple dental visits, dentists have an opportunity for assessing the blood pressure measurements at multiple time points.

The results of the present study underscore the need of measuring hypertension in dental clinics in Egypt as a routine practice for both early detection of elevated blood pressure and increasing the noncompliant patients' awareness about the complications of hypertension. Of course, it is important to measure blood pressure in the dental office to avoid cardiac emergencies during dental treatment.

Conclusion:

Dental patient screening for hypertension has the potential to benefit public health outcomes, by identifying patients with previously undiagnosed hypertension and cardiac care non-compliance, which should allow for earlier intervention and more acceptable health outcomes. Dental patient hypertension screening is accepted in many countries worldwide. Dental patient hypertensive screening has the potential to benefit public health outcomes in Egypt and worldwide.

Conflict of Interest: The authors declare that they have no conflict of interest.

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