

Hypertension Among Dental Patients: A Single Institution Experience and Development of a Working Clinical Algorithm for Dental Practitioners

Nalisha Mohamed Ramli¹, Raid Hamizan Mohd Zulkifle², Aqilah Salmi Abdul Salam², Nor Azura Ahmad Tarmidzi¹, Norashikin Amran¹

KEYWORDS

Hypertension, prevalence, blood pressure, dental treatment, algorithm

ABSTRACT

Hypertension is one of the most common comorbidities in Malaysia mandating the need for screening prior to dental treatment to identify undiagnosed cases and ensure safe delivery of care. A standard protocol is imperative to guide dental practitioners to manage their patients based on the blood pressure readings. This study identifies the prevalence of known and unknown cases of hypertension in patients attending Universiti Sains Islam Malaysia (USIM) Dental Clinic and proposed a working clinical algorithm to be used for dental patients with abnormal blood pressure. It involves a retrospective study of 386 patients from the year 2017 until 2021. All data were analysed using Statistical Program for Social Science (SPSS) version 28.0. A literature review was also done to construct a clinical algorithm. The prevalence of patients with known hypertension in our study is 33.2% and 29.8% of them presented with unknown elevated blood pressure reading. Only 9.3% of uncontrolled and unknown cases were actually given referral for medical assessment. The presence of patients unaware of their possible hypertensive condition warrants the need for screening prior to dental treatment, hence the need for a standard protocol for all dental practitioners.

INTRODUCTION

Hypertension can be defined as a persistent elevation of systolic blood pressure of 140mmHg or greater and/or diastolic blood pressure of 90mmHg or greater [1]. According to the World Health Organization, there is an increasing global burden of hypertension diagnosis especially in the Asia Pacific and Southeast Asia region [2]. There is a 144% increase in the number of adults with hypertension within thirty years in this region [2]. Only 54% of adults with hypertension are diagnosed and 42% are treated but barely 21% of them actually have controlled blood pressure [2]. Globally, 59% of women and 49% of men were diagnosed with hypertension in 2019 but only 47% of women and 38% of men were treated. Among

people with hypertension, only 23% of women and 18% of men have them under control [3].

Based on the National Health & Morbidity Survey Malaysia in 2019, 3 in 10 people or 6.4 million population in Malaysia have hypertension [4]. Sadly, only half were actually aware that they have the disease. 90% are on medication but only 45% have their blood pressure controlled [4]. Early detection and diagnosis of hypertension is crucial as it can provide awareness and a sense of urgency for the patient to seek the appropriate medical treatment needed. It can also provide the opportunity for prevention from this disease by educating them to adopt a healthier lifestyle [5,6]. Routine measurement of blood pressure (BP) may reduce the risk of cardiovascular events and acute complications during dental treatment, especially when delivery of conscious sedation or general anaesthesia is involved [7-9]. The American Society of Anaesthesiologists found that the probability of cardiovascular complications among hypertensive

¹Department of Oral & Maxillofacial Surgery, Pathology and Medicine, Faculty of Dentistry, Universiti Sains Islam Malaysia

²Oral Health Program, Ministry of Health Malaysia

*Corresponding author email: nalisha@usim.edu.my

patients during dental treatment should be taken into consideration as they have a higher risk for lethal complications such as stroke or myocardial infarction compared to healthy patients [10].

Dental visits can be an entry point for the general public into the healthcare system as dental diseases generally involve pain and infection [9,11]. Prevalence of dental service utilization in Malaysia has been reported to range between 13.2% to 23.7% [4,12-14]. Dentists are able to contribute to the prevention of hypertension by performing screening of blood pressure before treatment commencement and then conduct an evaluation of risk assessments during medical and family history taking as well as knowing when to consider referral for medical consultation whenever indicated [9,11,15].

Efforts are indeed needed to enable effective screening and identification of a safe blood pressure reading prior to dental treatment in order to prevent any life-threatening complications. Currently, in the literature, there are many guidelines available regarding hypertension management but those specifically related to dental management are scarce. In Malaysia, there is not yet any published standardised guideline regarding the management of hypertensive patients in the dental settings available.

In our study, we aim to identify the prevalence of patients with known case of hypertension and elevated blood pressure attending our institution. Furthermore, we also proposed a working clinical algorithm for patients with abnormal blood pressure in the dental settings.

MATERIALS AND METHOD

This is a retrospective study involving patients attending Dental Clinic at Universiti Sains Islam Malaysia of 5 years duration from the year 2017 to 2021. The information obtained include history of hypertension and blood pressure readings recorded in the patient's file. We included all patients aged 18 and above with complete dental records. This study was divided into two parts whereby part one consisted of the data collection and part two focused in the development of the clinical algorithm.

Part One: Data Collection from Patients' Records

Data collection was done using a data collection sheet containing information regarding patients' demographic data, hypertension history and blood pressure readings available during dental visits. The

patients' blood pressure readings were categorised according to the classification of hypertension by The United States National Institute of Health's Joint National Committee's Seventh and Eight Report 2004 and 2013 as shown in Table 1 [16,17].

Table 1 Hypertension classification by the 7th and 8th Report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure

Blood Pressure Classification	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Normal	<120	and <80
Prehypertension	120 – 139	or 80 – 89
Stage 1 Hypertension	140 – 159	or 90 – 99
Stage 2 Hypertension	≥160	or ≥100

Statistical analysis of the distribution and frequencies of the data was done using The Statistical Package for the Social Sciences (SPSS) Version 28. Descriptive statistics was also used to describe variables. Demographic characteristics and the distribution of known cases of elevated blood pressure readings and referral cases were presented in the form of frequencies and percentages.

Part Two: Development of Clinical Working Algorithm of Dental Patients with Elevated Blood Pressure

A literature review was performed regarding the management of patients with hypertension and elevated blood pressure in the dental settings. The bibliographic profile of this study includes published literature from the year 2012 to 2022. Articles regarding the topic above were selected according to the keywords: dental treatment, hypertension, management, and dental patients. The literature reviewed were written in English and retrieved from databases including PubMed, Google Scholar, Hindawi, Medline and Science Direct, published in international and national journals that met the descriptors of the theme mentioned above, including review articles, case reports and research papers. The algorithm was then reviewed, and feedback obtained by a specific content expert on general medicine, endocrinology, and oral and maxillofacial surgery.

This study has obtained ethical approval from the USIM's Research Ethics Committee (USIM: 2.12/244 (613) and was a final year project of undergraduate dental students.

RESULTS

The total number of patients involved in this study were 386 patients after considerations of the inclusion and exclusion criteria. Most of the patients included were in between the age of 50 to 59 years old (24.9%) with almost equal distribution between male (48.2%) and female (51.8%) patients. Majority were Malays (80.1%), followed by Chinese (11.1%), Indians (6%) and other races (2.8%).

33.2% patients attending our clinic between the year 2016 to 2021 were known cases of hypertension. However, 27.3% of them had no record of any blood pressure measurement taken during their dental visit and 35.1% did not have their blood pressure controlled even with getting diagnosed by a medical practitioner. A total of 114 patients (29.5%) were noted to have elevated blood pressure during routine dental visits despite of never been diagnosed with hypertension previously and up to 23.6% actually had blood pressure readings of more than 160/100 mmHg which is equivalent to Stage 2 hypertension according to the JNC 7 Classification [16]. Table 2 summarizes the category of patients included in our study. Of all the uncontrolled or untreated hypertensive patients as well as those with elevated blood pressure, only 9.3% of the cases were actually referred for medical assessment.

Table 2 Distribution of cases

Category of Patients	n (%)
Normal Blood Pressure Measurement	144 (37.3)
Known Case of Hypertension	128 (33.2)
No reading	35 (27.3)
Controlled Hypertension	39 (30.5)
Uncontrolled Hypertension	45 (35.2)
Untreated Hypertension	9 (7.0)
Elevated Blood Pressure Measurement with No History of Hypertension	114 (29.5)
Prehypertension (120-139/80-89)	57 (50.0)
Stage 1 (140-159/90-99)	30 (26.3)
Stage 2 ($\geq 160/\geq 100$)	27 (23.7)

A working clinical algorithm on the management of blood pressure level in dental patients is proposed based on literature search done (Figure 1).

The clinical algorithm divided patients into two (2) main categories during blood pressure screening which includes all patients aged 18 years and above including pregnant patients with no known history of hypertension and known hypertensive patients. Those patients with no history of hypertension were then divided further based on the measurement of blood pressure recorded. The subsequent decision on dental treatment and intervention will be based on the severity of the blood pressure recorded. In general, patients with normal blood pressure are recommended to have their blood pressure monitoring done every 2 years and those with elevated blood pressure level (120-139/80-89mmHg) is expected to be monitored annually. Elective dental treatments are advised to be postponed in patients with blood pressure exceeding 160-180/100-120mmHg and referral for medical assessment is needed. Meanwhile, those exhibiting blood pressure more than 180/120mmHg will need urgent referral to the health facilities.

Proposed Clinical Algorithm on the Management of Blood Pressure level in Dental Patients

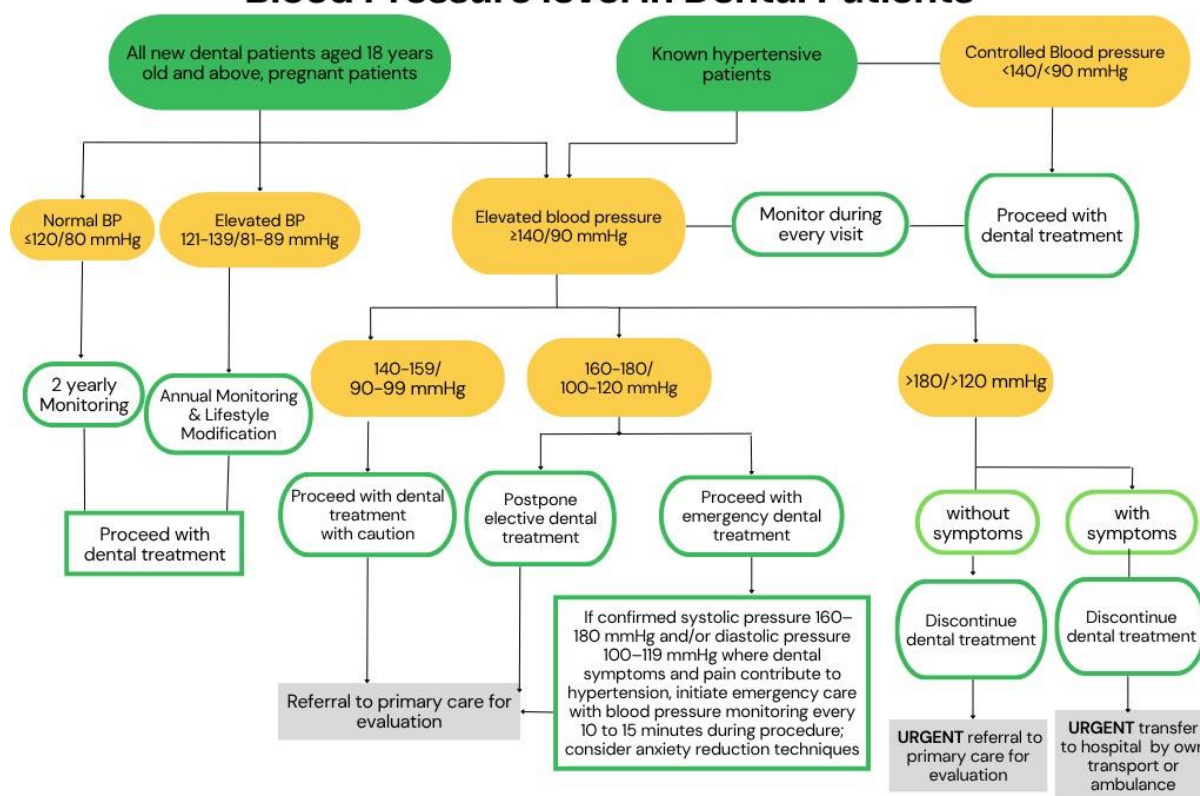


Figure 1 Proposed clinical algorithm on the management of blood pressure levels in dental patients

DISCUSSION

The prevalence of hypertension in our study population (33.2%) is higher compared to other studies done by Almoznino et al. [18] (2.5%) and AlKhaldi et al. [19] (18.97%) but is comparable to the findings of research done involving adults in Malaysia [20,21]. Patients with elevated blood pressure of more than 140/90 mmHg should be taken into consideration for extra precautions as they have the possibility of progressing to stage 1 and 2 of hypertension, hence require referral and subsequent monitoring [22]. 35.1% of our patients had uncontrolled hypertension and 7.0% were actually untreated. This value is concerning as having uncontrolled and undiagnosed hypertension poses a higher risk of getting cardiovascular diseases including coronary artery disease, heart failure, aneurysms, stroke and also renal diseases [23].

50% of our patients with unknown hypertension were in the prehypertensive stage but lower prevalence was reported by Al-Kayyal et al. (44.8%) [24]. It is indeed the responsibility of dental practitioners to make referral to medical

practitioners/physician for further investigation of a possible undiagnosed hypertension or even uncontrolled cases of hypertension. As a health professional also, dentists may advise patients to adopt lifestyle modification in order to reduce blood pressure level and delay the transition to stage 1 hypertension [25].

Only 9.3% of our patients requiring referrals were actually referred for medical assessment. This is undeniably alarming and concerning as the number of referrals is very low. Delayed referral or not referring at all might worsen patients' condition and increase the risk of developing complications including death [11]. It is imperative that dental practitioners must have a strong foundation of medical knowledge and in handling medical emergencies as these situations might occur anytime [7,11]. This solidifies the need for a working clinical algorithm that can help guide dental officers in the management of these patients. Furthermore, by being able to participate in screening and monitoring dental patients' blood pressure, it will close the gap of dentist and

physician roles in the control of non-communicable diseases in the community [26].

Despite all the discussions mentioned above, a possibility of white coat hypertension among dental patients should not be ignored especially in patients with no previous history of elevated blood pressure [22]. White coat hypertension is a condition where there is an elevated blood pressure readings during clinical visit of 140/90mmHg or more but normal blood pressure recorded in a non-clinical setting [27]. Still, a diagnosis of a white coat hypertension can be made via medical assessment by monitoring of home blood pressure and 24 hours ambulatory measurement [7,11].

Our team had proposed a clinical working algorithm for the management of blood pressure in patients attending dental clinic as shown in Figure 1. The clinical algorithm provides dental practitioners with a clear guide on which patients to screen, the frequency of monitoring, the type of dental treatment suitable for the patient based on their blood pressure readings as well as what to do in significantly elevated blood pressure readings and when referrals to primary care should be made.

The U.S Preventive Services Task Force in 2021 has recommended screening for hypertension in patients 18 years of age and older [28]. The Clinical Practice Guideline on the management of hypertension by Ministry of Health Malaysia in 2018 also stated that every adult aged 18 years or above must be screened for hypertension at least once a year as a part of their annual health screening [1]. Patients with blood pressure less than 160/100mmHg may undergo any type of dental treatment may it be elective or invasive procedure [11,22]. However extra precautions should be taken to prevent any untoward event related to dental treatment.

Elective dental procedures should be postponed in patients with blood pressure more than 160/100mmHg, but emergency dental care can still be done in patients with systolic pressure 160 to 180mmHg and diastolic pressure 100 to 119

mmHg if they presented with dental symptoms/pain contributing to hypertension [11,22].

Significantly elevated blood pressure (systolic pressure 180 mmHg and or diastolic pressure 120 mmHg) with no associated end-organ damage is categorised as hypertensive urgency meanwhile hypertensive emergency is defined as significantly elevated blood pressure associated with target organ damage [29].

The suggested absolute cut-off for any dental treatment is a blood pressure reading of 180/110 mmHg and above [11]. According to the Clinical practice guidelines on management of hypertension by Ministry of Health Malaysia in 2018, patients with severe hypertension (more than 180/110mmHg) are indicated for urgent referral [1]. Dental treatment in such patients must be immediately halted, referred to a medical physician and appointment should be rescheduled until the patient is in a stable condition [22,30,31].

CONCLUSION

The dental team plays a crucial role in screening for hypertension. About one-third of the patients in this study were hypertensive and only 30% of them have their blood pressure under control. A number of hypertensive patients were unaware of their underlying medical illness and only a few were referred. Hence, this shows how crucial it is for us to have a standard protocol as a guideline for dental practitioners in managing these patients.

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DECLARATION OF INTEREST

Authors declare no conflict of interest.

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