Original Article

"Paediatricians brace thyself" – Healthcare provider perspectives on childhood and adolescent hypertension: A qualitative study

Yamini Autkar Pusdekar[1,2], Jagannath V. Dixit[1], Akanksha P. Dani[2]

[1]Department of Community Medicine, B J Government Medical College, Pune, Maharashtra, India, [2]Department of Community Medicine, NKPSIMS and RC and Lata Mangeshkar Hospital, Nagpur, Maharashtra, India

Abstract

Context: Paediatric and adolescent hypertension is becoming a public health concern as it contributes to the development of cardiovascular diseases. However, the problem largely remains undiagnosed. This makes early detection and institution of appropriate preventive measures difficult. The existing diagnostic guidelines and management policies for paediatric hypertension are complex. They have individual specific cut-offs (based on age, gender and height), making their interpretation difficult. **Aims:** The present study aims to gain insights into paediatrician's perspectives on childhood hypertension. **Settings and Design:** Qualitative Studies using Key Informant Interviews (KIIs) were conducted with paediatricians to know about their perspectives on blood pressure assessment in children and adolescents, its barriers, their experience, practices and expectations for main streaming hypertensive screening in national health programmes. The interviews were audio recorded after taking their consent. **Statistical Analysis Used:** Grounded theory was used to analyse transcripts. **Results:** A total of 40 providers within the public and private health sector were invited to participate; 36 consented and completed the interviews. There was a perception of increased prevalence of paediatric hypertension. Several system, provider and patient-level barriers, like unavailability of paediatric-sized cuffs, and complicated guidelines for interpreting blood pressure, prevented screening and accurate diagnosis. **Conclusions:** Despite the lack of guidelines for screening, paediatricians still recommended lifestyle interventions. They expressed concerns about implementing standard guidelines for screening. They also expressed the need for a clinical assessment tool to assist in accurate diagnosis. They were willing to contribute to the development and implementation of training programme for health providers to overcome barriers to blood pressure measurement in children.

Keywords: Adolescent, barriers, children, hypertension, paediatricians, perspectives, pre-hypertension

Introduction

The non-communicable disease (NCD) epidemic is gaining foothold in the developing countries. Evidence has shown that the paediatric and adolescent population is also affected by NCDs like hypertension, which is also a risk factor for adult cardiovascular diseases.[1] The studies conducted among paediatric and adolescent population have revealed a combined prevalence of pre-hypertension and hypertension to be about 6%, or 3% respectively.[2,3] There is a fivefold rise in this prevalence of high blood pressure among the children and adolescents who are obese to nearly 30.0%. In a pilot study conducted by the authors, the prevalence of hypertension was around 7.0% and that of pre-hypertension was 12.5% among the students of 13-17 years in an urban area in Eastern Maharashtra.[4] Therefore,

Address for correspondence: Dr. Yamini Autkar Pusdekar, 20, Shriprabhukrupa, Dattatraya Nagar, Bh. Shivaji Sabhagruha, Nagpur - 440 024, Maharashtra, India.
E-mail: dryaminipusdekar@gmail.com

Received: 23-02-2023 **Revised:** 21-07-2023
Accepted: 27-07-2023 **Published:** 21-12-2023

Access this article online

Quick Response Code:

Website: http://journals.lww.com/JFMPC

DOI: 10.4103/jfmpc.jfmpc_353_23

How to cite this article: Autkar Pusdekar Y, Dixit JV, Dani AP. "Paediatricians brace thyself" – Healthcare provider perspectives on childhood and adolescent hypertension: A qualitative study. J Family Med Prim Care 2023;12:3209-16.

its early detection becomes important to bring in strategies for combating and preventing it.

Not only is the prevalence of essential hypertension rising in this age group, but there is cumulative evidence of damage to the target organs secondary to the development of hypertension. Secular trends show that these hypertensive children go on to become hypertensive adults when their blood pressures are tracked over a period.[5] This trend of rising blood pressure in children and teens is attributed partially to the increasing rates of obesity, stress, poor dietary habits and lack of physical activity in this age group.[6] Studies have revealed that simple lifestyle modification interventions are beneficial for curbing the long-term consequences of hypertension and keeping the blood pressure in check.[7-9] Considering the potential for prevention, it is imperative that the children should be diagnosed to target them for lifestyle modification interventions.

Factors limiting the diagnosis of hypertension and prehypertension in this population include a lack of awareness among primary care physicians and paediatricians who are responsible for treating the diagnosed children as their first point of contact.[10] There is a lack of awareness about the importance of measuring the child`s blood pressure at each paediatrician visit. Therefore, the problem remains undiagnosed at large. Additionally, the guidelines for screening or diagnosis and management of childhood and adolescent hypertension are not enforced in actual practice.[11] The interpretation of the blood pressure values is difficult due to the use of complex standards based on the age, height and gender of the child that, further makes the spot diagnosis by medical and para-medical personnel difficult.[12-14] Therefore, there is a huge gap in the disease burden, making its diagnosis and effective management a far-reaching goal.

The paediatricians, who serve as primary care physicians for the child and adolescent population, face several challenges in blood pressure measurement for children.[15] Beginning with the lack of knowledge about paediatric and adolescent hypertension, the non-availability of appropriately sized cuffs, and also the complexity of the interpreting standards make this an almost non-accomplishable task at the paediatrician visits.[10,16] Paediatricians, being the primary care physicians for children and adolescents, are in a strategic position to identify as well as manage hypertension in this population through lifestyle modification. Therefore, it becomes necessary to assess the perceptions as well as knowledge, attitude and practices of primary care physicians as well as their challenges and expectations with regard to this public health challenge of paediatric and adolescent hypertension. This will be of immense help in developing preventive strategies for children with prehypertension who may further be tracked as hypertensives in the future. The present study was designed in this context as a part of a larger randomised controlled trial for evaluating the effectiveness of a multifaceted lifestyle modification intervention[17] to gain insights into the perspectives of public and private sector primary health providers for children on paediatric and adolescent (13-17 years) hypertension with specific reference to the challenges in diagnosing, management and follow up of the paediatric hypertensive cases. The study specifically focuses on the knowledge, practices, and barriers to measuring paediatric blood pressure and their expectations for facilitating the same in routine healthcare practice.

Materials and Methods

Study Design

Qualitative study.

Study setting

The urban area of a district of Eastern Maharashtra.

Study population or subjects

Primary care paediatricians and their nursing and paramedical staff from both public and private health sectors.

Sampling technique and sample size

A purposive sample was obtained from the selected geographical area. The consecutive paediatricians were approached using snowballing technique to complete a total sample of 36 participants that included 27 paediatricians and 9 personnel from their hospital staff, mostly nursing and paramedical personnel, after which the recruitment was stopped due to the attainment of the saturation point.

Study duration

The study was conducted over a period of 3 months from July to September 2022.

Methodology

The ethical approval for the study was obtained from the institutional ethics committee. The study involved key informant interviews (KII) of the paediatricians. These were conducted after fixing a prior appointment with the healthcare providers. The findings presented in this study are from the formative phase of a larger cluster randomised controlled trial. The aim of this trial is to assess the effectiveness of a multifaceted health education and lifestyle modification programme targeted at the prevention of prehypertension and hypertension in young children.[17] The qualitative phase was carried out to inform about the perceptions as well as the barriers and facilitators for assessing pre-hypertension and hypertension among adolescents and to inform a multifaceted practice-based intervention that can be evaluated using a cluster randomised controlled trial.

Interview guide

We conducted one-to-one, semi-structured KIIs with paediatric health providers from the government and the private sector from July to September 2022. A semi-structured interview guide was prepared that included questions on sociodemographic variables like age, gender, education, designation and type of health provider (government or private) and years of experience.

The questionnaire also included questions regarding the paediatrician`s general knowledge of paediatric hypertension, its causes and effects and their awareness about the guidelines for diagnosis, evaluation and management of paediatric hypertension.

The next section of the interview guide dealt with their perceptions regarding hypertension among children and adolescents, along with their actual practices while measuring the blood pressure of young children. They were asked about the barriers in evaluating children for hypertension in general as well as factors peculiar to their own health practices. This was followed by questions related to the challenges faced by them or their staff while taking blood pressure in children. They were also inquired about whether they would appreciate the use of a clinical decision-making tool that would be useful for assessing and interpreting blood pressure values in children and adolescents. They were also asked if they would like help with regard to clinical evaluation, monitoring and management of cases with paediatric hypertension. They were asked if they would be open to getting trained in an educational programme on assessment and evaluation of blood pressure in children if given the opportunity. They were also asked about their personal experiences with diagnosis and management of childhood hypertension [Table 1].

Recruitment of study participants

The purposive sample of the paediatricians was selected beginning from the author`s institution and snowballing through the available references made by the interviewed participants. They were interviewed at a place selected by the participants. A total of 30 paediatricians from the government and private were invited to participate in the study. They were given an introductory call to fix the date, time and preferred place for the interview. Those who were willing to participate provided written informed consent before the interview.

Key informant interviews

Interviews were carried out by the principal investigator and a co-investigator and lasted for approximately 30-45 minutes each. The KIIs were mostly conducted at the paediatrician offices or at a place preferred by the interviewee. It was ensured that the place selected for the interview is private, with minimal disturbances and has a relaxed environment to provide adequate privacy and time for respondents to express their opinions freely. The interviewer used prompts according to the interview guide to probe for important issues. Interview guidelines were used to facilitate a wide array of responses related to their experiences and opinions. The paediatricians were requested to nominate staff from their institutions or health facility, who was interviewed about their perceptions on the challenges of assessing children for their blood pressure evaluation. They were specifically involved as in busy outpatient clinics, the task of measuring blood pressure was generally entrusted to the trained nurses or the paramedics. This also ensured that the perceptions of all the personnel involved in diagnosing and managing paediatric and adolescent hypertension were included in the study. Accordingly, ten supporting staff personnel nominated by the paediatricians, including six nursing and four paramedical staff, were also invited to participate in the study. However, one of them declined to participate, and the rest were included in the study. The interviews were audio recorded with prior consent from the participants. They were ensured about the maintenance of confidentiality and anonymity. Participation in the study was completely voluntary, and a verbal non-disclosure assurance was provided regarding the use of the deidentified information only for research purposes.

Table 1: Description of the sections of the interview guide

Subject	Related questions and prompts
General awareness	1. Have you heard about hypertension in children? 2. What, according to you, are the causes or risk factors for paediatric hypertension? 3. Do you know about any diagnostic guidelines and management principles for paediatric hypertension? 4. How is paediatric hypertension diagnosed? 5. How is paediatric hypertension classified? 6. How is paediatric hypertension treated? 7. What are the indications for pharmacotherapy among children diagnosed with hypertension? 8. Is there a role of supportive treatment for treating children diagnosed with hypertension?
Healthcare Practices	1. Do you usually measure the blood pressure of children and adolescents? 2. Do you encounter hypertensive children or adolescents in your practice/clinics/hospitals? 3. Does your clinic have appropriately sized cuffs for children and adolescents?
Perceptions about challenges in measuring BP in children	1. According to you, why is the diagnosis of high BP missed in children? 2. What challenges do you face in measuring and interpreting blood pressure values in young children? 3. What are your views on treating children with high blood pressure? 4. What do you consider as the best management practices for treating childhood hypertension?
Need for improved clinical assessment tools	1. Do you feel that you need some additional tools for decision-making in cases of paediatric hypertension? 2. What kind of training or tools do you think would be useful in detecting and managing paediatric hypertension?
Expectations for effective interventions for childhood and adolescent hypertension	1. What, according to you, would be the most effective means to combat paediatric hypertension? 2. Would you be willing to take part in an educational program focusing on paediatric HT? a. Why are you willing or why not? 3. What should be the components of this educational program on paediatric hypertension? 4. How can this or similar programmes be implemented?

Data analysis

Each recorded interview was transcribed verbatim by the principal investigator and co-investigator independently (APY and DA) in NVivo. Most of the interviews were conducted in English; however, there was a significant overlap of Hindi and Marathi, the locally spoken languages in the region. The interviews in local languages along with the parts of English interviews with local dialects, were translated verbatim to English and then used for analysis. The English translations were reviewed by a third-party vendor along with the original transcript to compare for any discrepancies, and the differences were discussed with the principal investigator to agree upon a common English transcript for retaining the original meaning of the narratives. The field notes taken during the interviews and discussions were also included in the analysis.

The transcripts were deidentified before coding. The primary coding was independently done by the three researchers involved in interviewing the participants based on the interview guide. After the preliminary coding, overlapping and similar codes were merged, themes were generated according to the objectives, and additional emergent themes were also included in appropriate codes. The final code book was then used for the manual coding of the transcripts. The transcripts coded using the software and manually were then merged to check associations as well as patterns for comparing the interviews across participants. Codes were again analysed to generate themes based on inductive thematic analysis approach[18] using the grounded theory approach.[19]

Both coding up and coding down approach was utilised. Coding down was done for the transcripts bases on the codes generated using the interview guides using themes that were based on the interview guides and up coding, was done using inductive mode of coding that helped in identifying the emerging themes. The team of researchers involved in thematic analysis discussed the descriptions and text from the transcript pertaining to thematic code. They conducted multiple group discussions for finalising the codes as well as the themes, following which the consolidated and summarised document for each theme, along with their supporting quotes, was developed. The NVivo 10 software (QSR International, Doncaster, Australia) was utilised for coding and thematic analyses.[20]

Results

The interviews were completed by 27 paediatricians out of 30 who were invited to participate giving a response rate of 90.0%. Among the nursing and paramedical staff, ten were invited to participate in the interviews, and nine of them responded, giving a response rate of 90.0%. Among the paediatricians, there were 11 paediatricians from the government sector (from 2 government medical colleges and one government hospital), and 16 of them were from the private health sector comprising a private medical college, one corporate hospital and private paediatric practice (including private hospitals and clinics). Among the nursing staff and the paramedical personnel, the majority of these were from private institutions.

The sociodemographic characteristics of the study participants like age, gender, educational qualifications, cadre of work and the years of experience after attaining the highest qualification are described in Table 2.

The age range for the paediatricians ranged from 29 to 57 years, and that for the nursing and paramedical staff was 24-31 years. Most of the paediatricians had a masters` s degree in the subject, and only two of them were diploma holders. The nursing and the paramedical staff were mostly holding general nursing or bachelor`s in nursing diplomas after 10 + 2 grade examination. The average experience of the participants ranged from 2 to 34 years [Table 2].

Thematic analysis

There were four emergent themes from the collected data based on the objectives of the study and the interview guide. The key findings under the four main themes and their subthemes which emerged from the interview transcripts, along with the supporting verbatim quotations, are described here.

Table 2: Baseline characteristics of the health care providers (paediatricians and support staff) (*n*=36)

Characteristics	Number	Percentage
Age (in years)		
25-30	9	25.0
31-35	12	33.3
36-40	8	22.2
>40	7	19.5
Gender		
Male	21	58.3
Female	15	41.7
Education		
PG Diploma (DCH)	4	11.1
MD Paediatrics	23	63.9
ANM/GNM	4	11.1
BSc Nursing	2	5.6
Public health Nursing	3	8.3
Cadre		
Paediatrician	27	75.0
Nurse	6	16.7
Paramedic	3	8.3
Place of work		
Government institution	17	47.2
Government hospital	6	16.7
Corporate hospital	1	2.8
Private hospital	5	13.9
Private clinic	7	19.4
Years of Experience		
<2 years	8	22.2
3-10 years	11	30.6
11-20 years	14	38.9
21-30 years	3	8.3

Theme 1 – Perception of a rising trend in childhood and adolescent hypertension

The participants were aware about the occurrence of hypertension among children and teenagers. Only a few of them expressed surprise when asked about the condition. Their paediatricians expressed an overall increase in the prevalence of paediatric and adolescent hypertension recently. One of the paediatricians, who is a private practitioner, mentioned that

"When I look back in my career as a pediatrician spanning more than 25 years, I have seen a static increase in children presenting with raised blood pressure levels, more so in the recent years"

A paediatrician in private practice for more than 10 years said that

"It has become an old school thought that children cannot have high blood pressure, I encounter a few cases every year".

A paediatrician from corporate hospital mentioned that,

"The problem is fairly common in the elites attending our hospital and is a gift of the affluent lifestyle and therefore we make it a point to assess the blood pressure atleast among the obese children"

Another paediatrician who was working in a government hospital mentioned that

"Raised blood pressure in children has been a constant observation in the recent years as children come with the complaints of headaches and loss of concentration"

One of the senior paediatricians from a government medical college sarcastically said that

"It not a major problem as the children attending our facility belong to poor families and face challenges like getting adequate nutrition, infections and poverty that are the basic issues than other conditions like hypertension"

Theme 2 – Risk factors for paediatric and adolescent hypertension

The thematic associations point towards the significant risk factors that could be playing a causative role in cases with paediatric hypertension. These factors are described below. Most of the participants agreed to the fact that obesity was a central factor in the children who presented with hypertension and that the association correlates strongly with an increasing prevalence of obesity among children. The other correlates for childhood hypertension were lifestyle changes, altering food habits, poor physical activity and excessive use of electronic media, which are described in the following subthemes.

Subtheme (i) Obesity

The paediatricians mentioned that the concordance of obesity and rising blood pressure was very high. This made them screen all the children who were obese for their blood pressure levels. The following quotes highlighted this subtheme:

[Occurrence of pediatric hypertension] "It goes along with the increase in the obesity prevalence in the child population and is certainly seen especially with older pediatric patients"……Govt hospital Pediatrician

"The problem [pediatric hypertension] is, mainly related to lifestyle and obesity issues. But certainly, the issue is not going away and it's something we're confronting more and more frequently"……Sr. Pediatrician and private practitioner (>20 years)

"Obesity among children is continuously on the rise and if not addressed is sure to bring several complications along with it, hypertension being one of them. Though we do not routinely monitor blood pressure levels but do it for older children and adolescents who are overweight and obese in the recent years"…….Public sector Pediatrician

Subtheme (ii) Lifestyle-related factors

Apart from obesity, other factors mentioned by paediatricians that play a major role in hypertensive disorders include increased junk food consumption in the form of packaged food, instant or ready-to-eat foods coupled with a lack of physical activity, along with the post-pandemic increased use of digital media. All of these factors are contributors to the development of obesity and, in turn, are also the torchbearers for childhood hypertension. This subtheme was supported by the following quotes.

"Children are easily attracted to packaged food and soft drinks that are easily available and have contributed to the obesity epidemic"……. Sr. Pediatrician (Pvt. sector)

"With restaurants closing down during COVID pandemic, the availability of junk food has increased and that too at the click of a button"……. Pediatrician (Govt hospital)

"Children these days are only snacking heavily and avoid fruits or vegetables as the fast foods are very handy at both home and also outside"……. Pediatrician (Pvt. medical college)

"Poor dietary patterns along with excess consumption of packaged foods leads to weaker generations with an average consumption of 3-6 packets per week. These foods are teeming with trans fats and added salt for preservability of these foods. They harm the children in the long run and need to be banished urgently"….Sr. Pediatrician (Pvt. practice >25 years)

Subtheme (iii) Physical activity

It has been recommended by the Centers for Disease Control that children and adolescents between the ages of 6 to 17 years should do at least 60 minutes or more of moderate-to-vigorous physical activity daily. Regular physical activity improves cardiorespiratory fitness, bone and muscle strength, control weight, and reduces anxiety and depression, thereby reducing the risk of developing hypertension or heart diseases in this age group.

The paediatricians were of the opinion that during this pandemic period, there has been a drastic reduction in the physical activity levels of children. This has led to the development of overweight and obesity among them. This has been expressed through the following codes

"Children are stranded indoors as parents fear for the child`s safety while playing outdoor. They are either playing games at home, watching television or stuck to their phones, that has further intensified the obesity

and its subsequent consequences as pediatric hypertension"…….. Pediatrician (Govt Medical college)

"Children were at home during the pandemic and were not allowed to play outside dur to the fear of acquiring the virus"……. Pediatrician (Pvt. Practitioner)

"The post pandemic generation of children is just playing the latest mobile games on their phones and shun outdoor games. There has been a steep decline in the frequency of outdoor play at school and even at homes"…… Pediatrician (govt hospital)

Subtheme (iv) Excessive use of digital media

With the outset of the COVID pandemic, all the schooling took place in homes, with children being given free access to digital media. This has led to a further decline in the time allocated to outdoor games and, as a result, has led to the development of lifestyle disorders, even among children. The following expressions supported the digital media overuse by children.

"Parents complain that children are addicted to the phones and denying its use or limiting the time for mobile use has led to increase in aggressive traits if they are asked to keep the phone aside"……. Sr. Pediatrician (Pvt. Practitioner)

"Children rarely play outdoors these days and even do not have playmates as they have accepted the gadgets provided to them by busy parents as their peers"…… Pediatrician (corporate hospital)

Theme 3 – Challenges in diagnosis and management (Paediatric hypertension)

The paediatricians and their supporting staff reported some of the provider and patient-level posing a challenge in diagnosing paediatric hypertension. There is no consensus and adherence to a particular guideline and no systematic approach that is followed among healthcare providers to review blood pressure values. This makes the diagnosis and follow-up difficult and uncertain. The difficulties faced while measuring the blood pressure included patient-level problems like fidgety children, lack of follow up and other provider-level difficulties like improper technique and poor equipment such as wrong-sized cuffs or non-availability of cuffs of proper size. The challenges in the measurement of blood pressure are illustrated by the following quotations.

Subthemes

Major subthemes related to theme three included three subthemes: paediatrician or provider-level challenges that were focused mainly on the lack of proper training of the doctors and the nurses for measuring the blood pressure levels in their curriculum. Thus, lack of training led to the inappropriate measurement of the BP and failure of a proper interpretation of the readings. The system-level barriers included overworked staff, non-availability of paediatric cuffs and complex guidelines that made it even more difficult to take the readings and interpret them for young children. The client or patient-level barriers included failure to follow up for ascertainment of the diagnosis of paediatric hypertension. The quotations supporting the subthemes were as follows.

Subtheme (i) – Lack of training in the curriculum

"….. lack of medical education is the most important predicament of the present day professionals with regards to BP measurement among children……Pediatrician govt institute

"When I was a student and a resident measuring the blood pressure in a child was not important but now it's becoming important..." Pediatrician (Private practitioner)

"There is a lack of focus on the occurrence of pediatric and adolescent hypertension as it was not described in our curriculum at that time but surely the times have changed and one needs to be vigilant for the signs of high blood pressure even in very young children" Pediatrician (Private medical college)

Subtheme (ii) – Pediatrician and system level fallacies

"Getting a blood pressure in a child takes time and the nursing staff are overburdened"……..Sr. Pediatrician (Govt)

"The paramedics may at times write normal blood pressure values for borderline hypertensives thinking it to be an error in measurement or the instrumental" ……. Paramedical staff (Govt)

"Many a times the clinics don't even have the appropriately sized cuffs"……. Nursing staff (Govt)

"Not having standardized guidelines for diagnosis and existent standards based on age gender and height make it difficult for assisting staff to identify and inform about HT"……. Nursing staff (Pvt medical college)

Subtheme (iii) Client level barriers

"If the child is detected with pre-hypertension and requested for follow up, only a third of them return for a second check for their blood pressure"……. Pediatrician (Pvt medical college)

"Once we advice lifestyle interventions, the parents do not keep a regular follow up as many a times the child also looses the motivation to continue with the suggested lifestyle changes"…… Pediatrician (Pvt hospital)

Theme 4 – Need for a clinical assessment tool or algorithm for interpretation of blood pressure values

Both the paediatricians and the nurses expressed the need for simple clinical interpretation and educational tools to help them in the accurate diagnosis and management of paediatric hypertension. Many health providers find it very cumbersome to interpret the child`s blood pressure using their age, height, and gender, thereby making them miss the diagnosis. They wished for a simple app that could interpret the blood pressure value if the child`s height, age and gender were inputted. This would be of immense help for labelling the diagnosis after interpreting the results on their own. The nursing and paramedical staff were willing to undergo further training to gain expertise in diagnosing childhood hypertension through the use of appropriate technology. The following quotes testify to their intent.

"A program or an application for inputting the crucial information that would give the direct interpretation will be suitable for use by paramedical staff" …….Public health sector Sr. Pediatrician

... *"more information in the form of effective guidelines on the management pieces is what is lacking in the current scenario"* ……. *Private practice pediatrician*

"We are not aware of when they need to be referred and when they don't need to be referred and can be treated in primary care"……. *Public health sector Pediatrician*

"We do desire additional education that will allow us to address the health needs of this patient population, with a specific focus on lifestyle management, as well as a clinical assessment tool aiding accurate diagnosis and management of these children"….Sr. Pead (Pvt)

Discussion

The study was conducted among public and private sector paediatricians from government, private and corporate hospitals and medical colleges. There was an overall consensus among the respondents regarding an increasing trend in childhood hypertension that was partially due to the rising rates of obesity in children. This confirms the findings from other studies that have established a clear association of obesity with childhood hypertension.[21-25]

The risk factors associated with hypertension other than obesity, as described by the paediatricians were consumption of unhealthy food items, lack of physical activity and overuse of digital media, some of which have also been emphasised in the studies conducted in this population.[26,27] Thus, childhood obesity is growing rapidly and the lifestyle factors directly impact the paediatric practice with regard to the diagnosis and management of childhood hypertension.

Primary care physicians attend to children and adolescents on a regular basis and are, therefore, at the most strategic level to address the issues of childhood obesity and hypertension. They are, however, limited by the lack of awareness, lack of training for measuring childhood blood pressure, non-availability of appropriately sized cuffs, use of complex guidelines that made interpretation of BP difficult for the nursing and support staff and individual-level factors.[26,27] There were also individual-level factors like being overworked, rounding off the blood pressures to lower values considering the erratic equipment and lack of proper follow-up on the part of the patients. Participants were of the opinion that a training programme as well as a technical solution for interpretation of the blood pressure readings would be of immense help to the paediatricians as well as their supporting staff to help in the evaluation and management of paediatric hypertension. The training will provide hands-on experience and will be essential for skill development and capacity building of the health personnel. This study also yielded inputs from providers for designing an application for accurate interpretation of blood pressure levels. The staff and providers were willing to be a part of an educational programme to overcome factors affecting the diagnosis and treatment of paediatric hypertension in this population, which show an increasing proportion of essential hypertension.

They also emphasised the need to incorporate routine blood pressure measurement in the national school health programmes that would prove to be an effective screening tool for targeting those at high risk of developing paediatric and adolescent hypertension and, therefore, its associated cardiovascular complications. They could be included in a lifestyle modification programme implemented and monitored at schools.

Conclusion

The study concluded that childhood and adolescent hypertension is on the rise. There are several system-level, intermediate-level and individual-level barriers for screening and management of childhood hypertension. There is a need for standardised clinical assessment tools and training programmes to strengthen accurate diagnosis of hypertension among children. The providers are willing to participate in training programmes and contribute to the development and implementation of protocols for health providers to overcome barriers to blood pressure measurement in children and adolescents.

Key points/take-home message

A. There is a gap in the diagnosis of hypertension in the paediatric and adolescent age group that is attributable to the lack of knowledge as well as cumbersome and complex guidelines for the classification and interpretation of blood pressure in children and adolescents, particularly by the supporting health staff.
B. Training of the paediatric professionals and their supporting staff in accurate measurement and interpretation of paediatric blood pressure will help in targeting at-risk individuals for lifestyle modification interventions.

Financial support and sponsorship

The study was funded by the Mamta Institute of Mother and Child, New Delhi, India.

Conflicts of interest

There are no conflicts of interest.

References

1. Daniels SR, Pratt CA, Hayman LL. Reduction of risk for cardiovascular disease in children and adolescents. Circulation 2011;124:1673-86. doi: 10.1161/CIRCULATIONAHA.110.016170.
2. Roulet C, Bovet P, Brauchli T, Simeoni U, Xi B, Santschi V, *et al.* Secular trends in blood pressure in children: A systematic review. J Clin Hypertens (Greenwich) 2017;19:488-97.
3. Bagudal S, Nanda P, Kodidala SR. Prevalence of obesity and hypertension in adolescent school going children of Behrampur, Odisha, India. Int J Physiother Res 2014;2:777-80.
4. Autkar Pusdekar Y, Dixit JV, Badhoniya N. Prevalence and determinants of hypertension and pre-hypertension among urban adolescent school students of the age group 13-17 years – A pilot study. NeuroQuantology 2022;20:182-93. doi:10.14704/NQ.2022.20.11.NQ66021.

5. Chen X, Wang Y. Tracking of blood pressure from childhood to adulthood: A systematic review and meta-regression analysis. Circulation 2008;117:3171-80. doi: 10.1161/CIRCULATIONAHA.107.730366.
6. Blumenthal S, Epps RP, Heavenrich R, Lauer RM, Lieberman E, Mirkin B, *et al.* Report of the task force on blood pressure control in children. Pediatrics 1977;59(5 2 suppl):I-II, 797-820.
7. Litwin M, Niemirska A, Sladowska-Kozlowska J, Wierzbicka A, Janas R, Wawer ZT, *et al.* Regression of target organ damage in children and adolescents with primary hypertension. Pediatr Nephrol 2010;25:2489-99. doi: 10.1007/s00467-010-1626-7.
8. Rao G. Diagnosis, epidemiology, and management of hypertension in children. Pediatrics 2016;138:e20153616.
9. Hansen ML, Gunn PW, Kaelber DC. Underdiagnosis of hypertension in children and adolescents. JAMA 2007;298:874-9. doi: 10.1001/jama.298.8.874.
10. Brady TM, Solomon BS, Neu AM, Siberry GK, Parekh RS. Patient-, provider-, and clinic-level predictors of unrecognized elevated blood pressure in children. Pediatrics 2010;125:e1286-93. doi: 10.1542/peds.2009-0555.
11. Patel ND, Newburn A, Brier ME, Chand DH. Pediatric hypertension: Are pediatricians following guidelines? J Clin Hypertens (Greenwich) 2016;18:1230-4. doi: 10.1111/jch.12915.
12. Bodenheimer T, Willard-Grace R, Ghorob A. Expanding the roles of medical assistants: Who does what in primary care? JAMA Intern Med 2014;174:1025-6. doi: 10.1001/jamainternmed.2014.1319.
13. Cha SD, Chisolm DJ, Mahan JD. Essential pediatric hypertension: Defining the educational needs of primary care pediatricians. BMC Med Educ 2014;14:154. doi: 10.1186/1472-6920-14-154.
14. Samal L, Linder JA, Lipsitz SR, Hicks LS. Electronic health records, clinical decision support, and blood pressure control. Am J Manag Care 2011;17:626-32.
15. Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents; National Heart, Lung, and Blood Institute. Expert panel on integrated guidelines for cardiovascular health and risk reduction in children and adolescents: summary report. Pediatrics 2011;128 Suppl 5(Suppl 5):S213-56. doi: 10.1542/peds.2009-2107C.
16. Yoon E, McCool B, Filipp S, Rocchini A, Kershaw D, Clark S. Pediatric hypertension specialists' perspectives about adolescent hypertension management: Implications for primary care providers. Clin Pediatr (Phila) 2015;54:551-6. doi: 10.1177/0009922814558248.
17. Autkar-Pusdekar Y, Dixit JV, Badhoniya N. Effectiveness of a lifestyle intervention for pre-hypertension and hypertension among school children of age group 13-17 years in an urban area in Eastern Maharashtra: study protocol for a pragmatic cluster randomized controlled trial (unpublished).
18. Taylor-Powell, E., & Renner, M. (2003). Analyzing Qualitative Data. Available from: http://learningstore.uwex.edu/assets/pdfs/g3658-12.pdf. [Last accessed on 2022 Sept 29].
19. Chun Tie Y, Birks M, Francis K. Grounded theory research: A design framework for novice researchers. SAGE Open Med 2019;7:2050312118822927.
20. Dhakal K. NVivo. J Med Libr Assoc 2022;110:270-2.
21. CDC 2021. Physical activity facts. Available from: https://www.cdc.gov/healthyschools/physicalactivity/facts.htm. [Last accessed on 2022 Sept 30].
22. Chorin E, Hassidim A, Hartal M, Havakuk O, Flint N, Ziv-Baran T, *et al.* Trends in adolescents obesity and the association between BMI and blood pressure: A cross-sectional study in 714,922 healthy teenagers. Am J Hypertens 2015;28:1157-63.
23. Brady TM. Obesity-related hypertension in children. Front Pediatr 2017;5:197. doi: 10.3389/fped.2017.00197.
24. Friedemann C, Heneghan C, Mahtani K, Thompson M, Perera R, Ward AM. Cardiovascular disease risk in healthy children and its association with body mass index: Systematic review and meta-analysis. BMJ 2012;345:e4759.
25. Nguyen NT, Magno CP, Lane KT, Hinojosa MW, Lane JS. Association of hypertension, diabetes, dyslipidemia, and metabolic syndrome with obesity: Findings from the national health and nutrition examination survey, 1999 to 2004. J Am Coll Surg 2008;207:928-34.
26. Ostchega Y, Hughes JP, Prineas RJ, Zhang G, Nwankwo T, Chiappa MM. Mid-arm circumference and recommended blood pressure cuffs for children and adolescents aged between 3 and 19 years: Data from the national health and nutrition examination survey, 1999-2010. Blood Press Monit 2014;19:26-31.
27. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. Pediatrics 2004;114(2 Suppl 4th Report):555-76. 10.1542/peds.114.2.S2.555.