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Evaluation of Prehypertension among School Going Adolescents in Chennai

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Abstract

Aim:- Adolescence is an important phase of life and increased stress has made them prone for early development of Metabolic disorders. Worldwide prevalence of Prehypertension is increasing and early identification of which will help to manage the development of early hypertension and its associated complications. Hence, current study aims to evaluate the prevalence of prehypertension among school going adolescents in Chennai.

Methods:- The study was conducted among school going adolescents *(n-264)* in Chennai between the age group 15-19yrs. Anthropometric measurements were taken and stress and sleep hygiene were assessed using validated questionnaires. Blood pressure was recorded using Hawkley random zero sphygmomanometer.

Results:- The overall prevalence of Prehypertension was found to be 22.3%. Prehypertension was found to be more in females (23.1%) than males (21.6%).

Conclusion:- There is an increased prevalence of prehypertension among school going adolescents in Chennai. Adolescents should be taught about the importance and benefits of healthy lifestyle for a healthy future.

Keywords:- *Adolescents, Prehypertension, Sleep, Stress, Cardiac issues*

Introduction

Adolescence is a critical and crucial phase of human life and plays an important role in determining an individual's future. As per WHO, Adolescence is the 'period between 10-19years of life'[1]. Adolescence is recognized as both enjoyable and stressful period, and the stress phase of adolescence is reported as the most stressful period in the entire lifespan of an individual. In current era, along with the pre-existing psycho-physiological stress, academics, family and peer pressure has increased the stress level and have made adolescents more prone for psycho-somatic disorders [1].

Prehypertension is a recently coined term and in 2003, the Seventh Report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure (JNC7) has defined prehypertension as 'the Systolic blood pressure (SBP) between 120-139mmHg or the diastolic blood pressure (DBP) between 80-89mmHg'[2]. Prolonged persistence of Prehypertension makes an individual more prone for early development of sustained hypertension[3,4]. Hypertension is a global health issue and has been identified as major risk for most of the cardiovascular diseases. In 2010, Hypertension has been reported as major cause for morbidity and mortality worldwide [5].

In recent years, prevalence of prehypertension is increasing among adolescents and remains undiagnosed[6,7]. Prehypertension being a risk factor for hypertension if left undiagnosed makes adolescents to

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develop early hypertension thus making them prone for early cardiovascular diseases and premature death [8,9]. Hence, early identification of prehypertension among adolescents becomes need of the hour.

Material and Method

Study participants:-

A cross sectional study and was commenced after obtaining permission from the institutional ethics committee. Study participants were recruited from a private school in Urban Chennai, and the school was selected using computerized randomization software from the school list of urban corporation. Participants were healthy school going adolescents and between the age group (15-19yrs) *(n-264)*. Students with pre-existing primary and secondary hypertension were excluded and participants those who got parent's consent and also gave assent were included in the study.

Study tools:-

General and demographic details about the participants were collected using a questionnaire. Anthropometric measurements like Height, weight, Neck circumference (NC), Waist and Hip Ratio were measured. Blood pressure was assessed using Hawksley random zero sphygmomanometer.

Stress was assessed using Perceived Stress Scale (PSS). PSS is a 10 item self reported questionnaire where the participants answer to ten different questions/ situations. Based on a structured scoring pattern the participants will be categorized in to mild, moderate and severe stress[10]. Sleep hygiene was assessed using Epworth Sleepiness Scale for Children and Adolescents (ESS-CHAD). ESS-CHAD has eight different situations for which the participants should answer his chances of dozing in a scale of 0-3. Total score < 10 signifies good sleep hygiene and total score >10 signifies presence of Excessive Daytime Sleepiness, a sign of compromised Sleep hygiene[11].

Study Procedure:-

The school authorities were explained about the purpose and benefits of the study and written permission was obtained. Informed consent form was distributed two days before the data collection day to get consent from parents and assent was also obtained from the participants. General questionnaire, Perceived Stress Scale, Epworth Sleepiness Scale were explained to the participants and were assisted to complete them. Anthropometric measurements like Height, weight, Neck circumference (NC), Waist-hip ratio (WHR) were taken and BMI was also calculated.

Arterial Blood pressure was measured using a Hawksley random zero sphygmomanometer with appropriate size cuffs. The participants were asked to relax in supine lying for 10minutes and Blood Pressure (BP) was recorded in sitting position. Three readings were taken with regular intervals and BP was noted[5]. BP of all the participants were recorded by trained healthcare professionals

Statistical analysis

The Data were tabulated in MS Excel sheet and SPSS Version 21.0 was used to analyze the data. Descriptive statistics was calculated for background variables. Association between categorical variables was tested by chi-square test and $p<0.0.5$ was taken as statistically significant.

Findings

Total number of participants considered for the study were 271 and those who willingly participated and completed the study were 264, consisting of 134 males and 130 females (n-264). Mean age of the study participants was 15.75+0.65. Among the total participants 50.8% were males and 49.2% were females. Majority of the study participants were from board exam appearing class (39%).

22.3% of the study participants were found to have prehypertension out of which 35.5% of them belong to the board appearing class. (Figure 1)

Genderwise, 21.6% of males and 23.1% of the females were found to have prehypertension though the p value was statistically insignificant.

Majority of the participants were found to be moderately stressed. 19% of participants with mild stress, 26.8% of participants with moderate stress and 17.2% of participants with severe stress were found to have prehypertension and p value was found to be statistically insignificant.

32.2% of the participants with compromised sleep hygiene were found to have prehypertension and p value was found to be statistically significant showing that reduced sleep hygiene increases chances of developing

blood pressure.

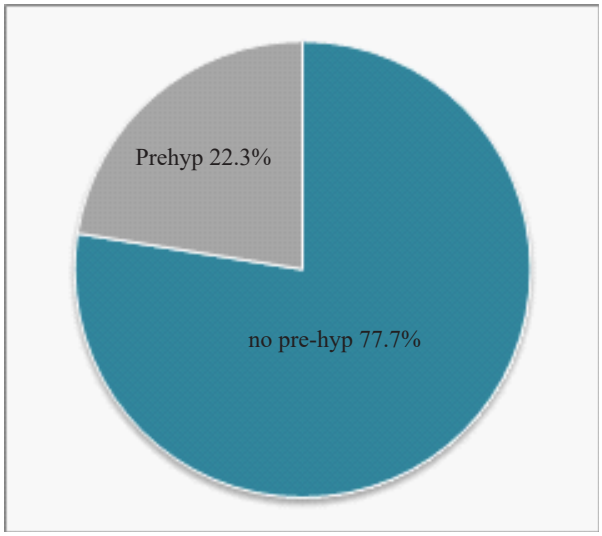

Fig 1. Prevalence of Prehypertension among adolescents

Table 1. Genderwise prevalence of Prehypertesnion among adolescents

Gender	Prehypertension	p value
Males	29 (21.6%)	0.780*
Females	30 (23.1%)	

*p<o.o5 is statistically significant

Table 2. Stress and Prehypertension

PSS Score	Prehypertension	p value
Mild stress	15 (19%)	0.244*
Moderate stress	34 (26.8%)	
Severe stress	10 (17.2%)	

*p<o.o5 is statistically significant

Table 3. Sleep and Prehypertension

ESS Score	Prehypertension	p value
ESS <10	40 (19.5%)	0.03*
ESS ≥ 10	19 (32.2%)	

*p<o.o5 is statistically significant

Discussion

The current study shows the prevalence of Prehypertension among school going adolescents to be to be 22.3%**.** A study conducted among adolescents in East Nigeria showed prevalence of Prehypertension among adolescents to be 17.3% with females having more prevalence than males[12]. Another study conducted in Houston showed that atleast 30% of adolescents had one elevated BP during recording[13]. A study conducted in Kerala reported prehypertension among adolescents to be 24.5%[14] and another study conducted in southern part of Tamilnadu showed prevalence of prehypertension among school going adolescents to be 14.1% [5]. These reports reveal the fact that prevalence of prehypertension is more among adolescents which could be due to their psycho-physiological, psycho-social factors and other lifestyle modifications**.** Genderwise, prehypertension was found to be more in females (21.6%) than males (23.1%). Ingeneral females are more prone for stress and related psychological issues due to hormonal and other psycho-social factors, which along with academic pressure would have made females to develop prehypertension than male adolescents [13].

Stress is common among school going adolescents and has negative impact on health. Distress is a phenomenon which triggers negative pathways in the host and increases the level of stress hormones. Stress hormones such as cortisol, catecholamines increases heart rate, damages blood vessels and causes prehypertension, which if undiagnosed slowly progresses to chronic Hypertension[15]. In our study we found that adolescents with stress develop prehypertension though the p value was statistically insignificant

The results have shown that adolescents with compromised sleep hygiene (ESS>10) have prehypertension. Sleep is required for good physical and mental health. In adolescents sleep becomes an indispensable component required for learning, memory consolidation and healthy growth. Sleep deprivation triggers stress hormones and sympathetic nervous system. Frequent stimulation of sympathetic nervous system increases free radicals and damages blood vessels predisposing to prehypertension and early cardiac diseases [15,16,17,18,19]**.**

Persistent prevalence of prehypertension makes adolescents more prone for development of early hypertension. According to WHO, Hypertension is major risk factor for increased mortality. Young individuals with hypertension were more prone to develop hypertensive cardiovascular complications than older individuals [20], which leads to decreased quality of life and premature death. Prehypertension

among adolescents has been found to be associated with cardiac, renal alterations and target organ damage [21,22]. Adolescents with prehypertension were found to have Left Ventricular Hypertrophy (LVH). Even adolescents with mild elevated blood pressure were found to have target organ damage and early occurrence of metabolic syndrome [23]. Than normotensive adolescents prehypertensive adolescents were reported to have increased arterial stiffness and decreased diastolic function [24].

Conclusion

The current study shows that prevalence of prehypertension is high among school going adolescents in Chennai. Persistent prevalence of prehypertension makes them more prone for development of early hypertension and cardiac diseases which inturn reduces their quality of life. Hence, adolescents should be taught about stress management, importance of physical exercises and healthy diet to lead a healthy life [16,17].

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Ethical Clearance:- Institutional ethics committee (IEC) clearance obtained.

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