Prevalence of Hypertension Among School Children in a Rural Area of Tamil Nadu

A cross-sectional study was conducted to measure the prevalence of hypertension among 310 rural school children in Tamil Nadu. The prevalence of hypertension and pre-hypertension was 10% and 14.2%, respectively. Prevalence was significantly higher among and private school students. We recommend that children should be screened for hypertension for early diagnosis and prevention of complications.

Keywords: *Adolescent, Epidemiology, Hypertension*.

High blood pressure (BP) in children has been considered as a potential risk factor for hypertension in adulthood. Blood pressure varies with age, sex and height in children; therefore the diagnosis is complicated and nearly 75% of hypertensive children remain undiagnosed [1]. This study determined the prevalence of hypertension and pre-hypertension among school children in a rural area of district Villupuram, Tamil Nadu.

This cross-sectional study was conducted among school children aged 11-15 years in 2013. Two schools (1 Government and 1 Private) were selected purposively, and all the students belonging to class VI to X were included. A total of 310 school children (173 boys and 137 girls) were interviewed and examined. Automated BP measuring apparatus (OMRON) was used. Hypertension was defined as average systolic BP and/or diastolic BP ≥95th percentile for gender, age, and height on ≥3 occasions. Pre-hypertension was defined as average SBP or DBP levels ≥90th percentile but < 95th percentile. Data was analyzed using SPSS version 17.0. Chi-square test was used for analysis and *P* value <0.05 was considered statistically significant. Institutional Ethics Committee clearance was obtained. Permission was obtained from school authorities and written consent from the parents. Assent was also obtained from the children.

Participants were equally distributed across the different age groups (data not shown). The overall prevalence of hypertension in our study participants was 10% and prevalence of pre-hypertension was 14.2%. There was significant difference in prevalence of hypertension between students of government or private school (***Table* I**).

The prevalence of hypertension in our study was higher as compared to some earlier studies from similar setting [2,3]. This could be due to different socio-demographic characteristics. The prevalence of pre-hypertension in our study was similar to that of study done by Rahman, *et al*. [3]. Increasing prevalence of hypertension might be due to childhood obesity as well as growing awareness of the diseases [3-6]. We suggest that children should be screened regularly for hypertension to

TABLE I DISTRIBUTION OF STUDY PARTICIPANTS, BASED ON SELECTED DETERMINANTS AND HYPERTENSION (*N*=310)

Determinants	*Hypertension, n (%)*	*Pre-hypertension, n (%)*	*Normal, n (%)*	*Total*	*P value*
School					
Government	9 (5.5)	23 (14.0)	132 (80.5)	164	0.017
Private	22 (15)	21 (14.4)	103 (70.6)	146	
Age					
10-12	16 (12.9)	17 (13.7)	91 (73.4)	124	0.967
13-15	15 (8.06)	27 (14.5)	144 (77.4)	186	
Gender					
Males	14 (8.1)	20. (11.6)	139 (80.3)	173	0.111
Females	17 (12.4)	24 (17.5)	96 (70.1)	137	
Body Mass Index					
Obesity & Overweight	3 (11.6)	5 (19.2)	18 (69.2)	26	0.553
Normal	19 (12.3)	23 (14.8)	113 (72.9)	155	
Underweight	9 (7.0)	16 (12.4)	104 (80.6)	129	
Total	31 (10.0)	44 (14.2)	235 (75.8)	310	

prevent the complications in adulthood.

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Is Mid-upper Arm Circumference Alone Sufficient to Identify Severe Acute Malnutrition Correctly?

Anthropometric data of 2466 children in Haryana revealed low sensitivity (6.9%) and positive predictive value (14.3%) of Mid-upper Arm Circumference (MUAC) at 115 mm cut-off for identifying Severe acute malnutrition (SAM). This raises concerns regarding the reliability of MUAC as a screening tool to identify SAM at the community-level.

Keywords: *Anthropometry, Diagnosis, Undernutrition*.

Mid-upper-arm-circumference (MUAC) is used to detect severe acute malnutrition (SAM) among under-five children in community settings due to its ease of use. WHO had earlier fixed a cut-off of 110 mm, but later suggested a new cut-off of 115 mm for defining SAM based on experience from African countries [1]. However, there is a paucity of data validating these cut-offs in Indian setting [2].

A community-based cross-sectional survey was carried out in four districts of Haryana. In each district, 10% of Sub-centres (SC) areas were selected randomly with representation from rural, urban and slum areas according to Probability Proportionate to Size. 40 children were selected from each sub-centre, divided equally from two randomly selected villages under the Sub-centre. A total of 2466 children in the age group 6 mo-6 years were included in the study. Anthropometric measurements such as weight (up to nearest 1g, using TARE function), height (up to nearest 1 mm) and recumbent length in case of infants (up to nearest 1 mm) were measured using standard equipment and procedures by graduate level field investigators who were trained in use of anthropometric equipment [3]. The Mid Upper Arm Circumference (MUAC) was measured using Shakir's tape [4]. Nutritional assessment was carried out using WHO Child Growth Standards according to z-score classification. Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of MUAC method was calculated for different cut-offs against weight-for-height Z scores below –3. Ethical clearance was obtained from the Institute Ethics Committee of Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh. The children diagnosed with SAM were referred to the district hospital, with follow up by local Auxiliary nurse midwife.

The study population included 1428 (58%) males. The mean (SD) age of subjects was 29.3 (14.5) months. The mean (SD) weight, height and MUAC were 10.5 (2.64) kg, 83.1 (10.67) cm, and 14.1 (1.4) cm, respectively. As compared to the gold standard test, MUAC (<115 mm) method was found to have a high specificity (96.4%) and NPV (92.2%) but very low PPV (14.3%) and sensitivity (6.9%). Sensitivity and positive predictive values were higher when MUAC –3 Z score cut-off was used as compared to MUAC less than 11.5 cm cut-off (***Web Table* I**). Prevalence of SAM when computed using WHZ scores was found to be 3.5% (children below –3 WHZ score), but with MUAC method, it was found to be 2.3% and 1.8% for children below –3 MUAC Z-score and children with less than 11.5 cm MUAC, respectively. In this study, the prevalence of SAM based on WHZ was found to around