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Exploring the relationship between measured and perceived blood pressure in vision and hearing impaired adolescents

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Abstract
People with visual and hearing impairment need more support in their psychosocial and physical development. Child with poor vision not only face a lot of individual hardships through his early developing years but also presents many challenges and problems to the responsible adults in his life. Children's Hypertension is a rising public health issues attracting the attention in worldwide medical professionals. Hypertension in childrenexhibits strong correlations with a variety of factors, among which bodyweight assumes considerable significance. The purpose of the present investigation was to measure the systolic and diastolic blood pressure of vision and hearing-impaired special school children of Karnataka state. Further the level of perception on blood pressure was also correlated with their actual status. The present study was conducted on 414 vision and hearing-impaired children selected through purposive random sampling technique. The study included adolescents with vision impairment (N=243) and hearing impairment (N=171) in male category. All the subjects were residents of special schools within Karnataka state. Their age ranged between 13 to 18 years. The systolic and diastolic blood pressure measurement was done by following the standard procedure. The level of perception on systolic and diastolic blood pressure of hearing as well asvision loss school children was done using a 3 point likert scale. The systolic blood pressure of 13 to 14 years with 112.24 ± 10.89; 115.94 ± 9.37 in 15 to 16 years; and 118.38 ± 9.81 in 17 to 18 years. The diastolic blood pressure was 78.68 ± 8.81 in 13 to 14 years; 79.85 ± 7.22 in 15 to 16 years; and 80.41 ± 7.13 in 17 to 18 years. On the basis of the findings of the present study it is concluded that nearly half of the special school children are found to be deviating from normal blood pressure. Further, the special school children under investigation are unable to significantly perceive their blood pressure accurately.

Keywords: blood pressure, systolic, diastolic, vision loss, hearing loss

Introduction

People with visual and hearing impairment need more support in their psychosocial and physical development. Child with poor vision not only face a lot of individual hardships through his early developing years but also presents many challenges and problems to the responsible adults in his life. It visually impairment, also known as vision impairment, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses.

Physical activity participation is widely recognized as a critical component of health and development for disabled and non-disabled children. Emergent literature reflects a paradigm shift in the conceptualization of childhood physical activity as a multi-dimensional construct, encompassing aspects of physical performance, and self-perceived engagement (Ross, *et. al*., 2016) [10]. Arterial blood pressure values follow a log-normal or a normal circulation in the population, and so the various types of disease unit. In blood pressure hypertension has been measured to be a quantitative deviation from the norm. Blood pressure norm for adults, an arbitrary cut-off point at 160/95 millimetres of mercury has gained quite widespread worldwide acceptance. In the childhood age-group, however, the circumstances are different although it is realised that fundamentally hypertension has its early stages in childhood but long-standing prospective studies on children are lacking (Bose, Marimuthu, Chakraborty, 2000) [2]. Blood pressure levels are different in population because of hereditary, cultural and socio-economic factors. Local reference values have to be established be aware of the blood pressure variable (Krishna *et. al.*, 2006) [6]. Children's Hypertension is a rising public health issues attracting the attention in worldwide medical professionals. Hypertension in children exhibits strong correlations with a variety offactors, among which bodyweight assumes considerable significance. Heavy weight resulting in hypertension in children deserves instant attention even in large developing economies like India, China and Brazil (Raj *et. al.*, 2009) [9]. There are a small number of studies on distribution of hypertension in Indian children. Blood pressure studies in national data is lacking in this perspective. A small amount of studies done in India but they are limited to small region of children. Childhood hypertension is one of the emerging public health problems, since it leads to development of adulthood hypertension early in life (Sabapathy, Nagaraju, Bhanuprakash, 2017) [11].

The objective of the study

The purpose of the present investigation was to measure the systolic and diastolic blood pressure of vision and hearing impaired special school children of Karnataka state. Further the level of perception on blood pressure was also correlated with their actual status.

Methodology

The present study was conducted on 414 vision and hearing impaired children selected through purposive random sampling technique. The study included adolescents with vision impairment (N=243) and hearing impairment (N=171) in male category. All the subjects were residents of special schools within Karnataka state. Their age ranged between 13 to 18 years.

The systolic and diastolic blood pressure measurement was done by following the standard procedure (Heinemann, *et. al.,* 2008) [4]. The systolic and diastolic blood pressure of an individual was measured by automated Omron 10 Series blood pressure monitor. Before taking the blood pressure reading, subject was made to sit comfortably on the chair. The size of the cuff was chosen based on the size of an individual and the test was carried out early in the morning. The cuff of the instrument was wrapped around the upper arm of an individual and attached to the monitor and then located the brachial artery. The outlet valves were closed and inflated the cuff while palpating the radial artery pulse until the pulse was obliterated, so that flow of blood through artery was arrested and radial pulse disappeared. The pressure was then gradually lowered by opening the valves. As soon as the pressure in the cuff fell just below the systolic pressure, it allowed the passage of small amount of blood through the compressed artery into the distal segment. Then, the pressure showed on the monitor as soon as the sound heard and recorded as systolic blood pressure of an individual. As the cuff pressure lowered still further, more blood flowed through due to rebounded relaxation of the artery vessel and was indicated by beep sound. The pressure at which the sound could be muffled the pressure pump was read on the blood pressure monitor. This denoted the measurement of systolic and diastolic blood pressure and noted as the score of an individual. The blood pressure was measured by millimetre of mercury (mmHg).

Further the level of perception on systolic and diastolic blood pressure of hearing as well asvision loss school children was done using a 3 point likert scale. The subject was asked to rate his estimated blood pressure on a questionnaire wherein he was given to tick one of the three options viz a) Higher than the normal b) Normal or c) Lower than the normal. The response given by the subject was purely based on the perception of the subject under investigation (Rahmani-Nia,*et al*., 2011). The researcher gave a brief overview of systolic and diastolic blood pressure in order to make them familiar and express their levels of perception. The data from vision impaired subjects was collected through dictation and response record method. Similarly, data from hearing loss school children was collected through sign language method with assistance of a trained helper. The data was collected at the residential schools with prior intimation and permission. Pearson product moment correlation was used as a statistical tool apart from descriptive statistics like mean and standard deviation.

Findings of the study

Descriptive statistics including mean and standard deviation were employed to the raw data collected on systolic and diastolic blood pressure of the subjects selected for the study. The results are provided in table 1.

Table 1: Descriptive results on characteristics of vision and hearing loss children

Variable	Units	13 to 14 years	15 to 16 years	17 to 18 years
		Mean ± S. D	Mean ± S. D	Mean ± S. D
N		128	176	110
Age	in years	13.45 ± 0.50	15.45 ± 0.50	17.45 ± 0.50
Systolic blood pressure	MmHg	112.24 ± 10.89	115.94 ± 9.37	118.38 ± 9.81
Diastolic blood pressure	MmHg	78.68 ± 8.81	79.85 ± 7.22	80.41 ± 7.13

The table 1 depicts that the systolic blood pressure of 13 to 14 years with112.24 ± 10.89; 115.94 ± 9.37 in 15 to 16 years; and 118.38 ± 9.81 in 17 to 18 years. The diastolic blood pressure was 78.68 ± 8.81 in 13 to 14 years; 79.85 ± 7.22 in 15to 16 years; and 80.41 ± 7.13 in 17 to 18 years. Table 2 provides results on Systolic blood pressure of vision and hearing loss school children with reference to available norms.

Table 2: Norms based results on systolic blood pressure of vision and hearing loss school children

Normative values	Normative category	13 to 14 Years		15 to 16 Years		17 to 18 Years		
		F	%	F	%	F	%	
140 & Above	Hypertensive	2	1.56	3	1.70	3	2.73	2.00
120 to 140	Pre-hypertensive	22	17.19	44	25.00	49	44.55	28.91
90 to 120	Normal	102	79.69	129	73.30	58	52.73	68.57
90 & Below	Low	2	1.56	0	0	0	0	0.52
Total		128		176		110		

F= frequency, %=Percentage

Table 2 clearly depicts that in vision and hearing loss school children of 13 to 14 years (1.56%) were hypertensive systolic blood pressures; pre-hypertensive systolic blood pressure (17.19%); normal systolic blood pressure (79.69%) and (1.56%) low systolic blood pressures. In vision and hearing loss school children of 15 to 16 years it is observed that (1.70%) hypertensive systolic blood pressures; pre-hypertensive systolic blood pressures (25.00%); normal systolic blood pressures (73.30%) and none of the subjects was low systolic blood pressures. Further, in vision and hearing loss school children of 17 to 18 years it is found that (2.73%) were hypertensive systolic blood pressures; had pre-hypertensive systolic blood pressures (44.55%); normal systolic blood pressures (52.73%) and none of the subjects was low systolic blood pressures. The norms for the present percent analysis were obtained from (Blood Pressure Association, United Kingdom, 2008) [1]. Table 3 provides information on diastolic blood pressure of special population under investigation. The above results are graphically depicted in figure 1.

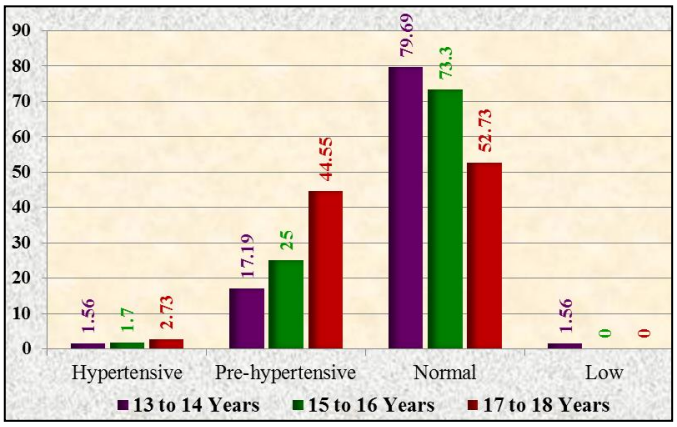

Fig 1: Norms based results on systolic blood pressure of vision and hearing loss school children in karnataka

Table 3: Norms based results on diastolic blood pressure of vision and hearing loss school children

Normative values	Normative category	13 to 14 Years		15 to 16 Years		17 to 18 Years		Total
		F	%	F	%	F	%	
Above 90	Hypertensive	12	9.38	11	6.25	4	3.64	6.42
81 to 90	Pre-hypertensive	36	28.13	77	43.75	48	43.64	38.51
61 to 80	Normal	79	61.72	87	49.43	58	52.73	54.63
Below 60	Low	1	0.78	1	0.57	0	0	0.68
Total		128		176		110		

It is clear from the table 3 that in vision and hearing loss school children of 13 to 14 years 9.38 per cent were hypertensive diastolic blood pressure; pre-hypertensive diastolic blood pressure 28.13 per cent; normal diastolic blood pressure 61.72 per cent low diastolic blood pressure 0.78 per cent. In vision and hearing loss school children of 15 to 16 years it is observed that 6.25 per cent were high diastolic blood pressure; pre-hypertensive diastolic blood pressure 43.75 per cent; normal diastolic blood pressure 49.43 per cent and low diastolic blood pressure 0.57 per cent. Further, in vision and hearing loss school children of 17 to 18 years it is found that 3.64 per cent were high diastolic blood pressure; pre-hypertensive diastolic blood pressure 43.64 per cent; normal diastolic blood pressure 52.73 per cent and none of the subjects was low diastolic blood pressure. The norms for the present percent analysis were obtained from (Blood Pressure Association, United Kingdom 2008) [1]. Table 4 provides information on association between measured and perceived blood pressure of vision and hearing loss school children in the age group 13 to 14 years. The above results are graphically depicted in figure 2.

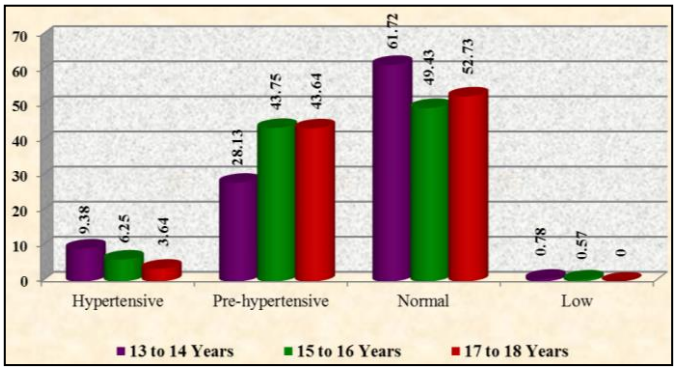

Fig 2: Norms based results on diastolic blood pressure of vision and hearing loss school children in karnataka

Table 4: Correlation between measured and perceivedsystolic and diastolic blood pressure in 13 to 14 years

		Actual Systolic Blood Pressure	Actual Diastolic Blood Pressure
Perceived Blood Pressure	Pearson Correlation	.028	.087
	Sig. (2-tailed)	.757	.330
	N	128	128
**. Correlation is significant at the 0.01 level (2-tailed).			

It is clear from the table 4 that there was no significant relationship between levels of perception on blood pressure and measured blood pressure in vision and hearing loss school children of age 13 to 14 years. Table 5 provides information on association between measured and perceived blood pressure of vision and hearing loss school children in the age group 15 to 64 years.

Table 5: Correlation between measured and perceived systolic and diastolic blood pressure in 15 to 16 years

		Actual Systolic Blood Pressure	Actual Diastolic Blood Pressure
Perceived Blood Pressure	Pearson Correlation	.125	.125
	Sig. (2-tailed)	.099	.098
	N	176	176
**. Correlation is significant at the 0.01 level (2-tailed).			

Analysis of table 5 depicts that there was no significant relationship between levels of perception on blood pressure and measured blood pressure in vision and hearing loss school children of age 15 to 16 years. Table 6 provides information on association between perceived and measured blood pressure of vision and hearing loss school children in the age group 17 to 18 years.

Table 6: Correlation between measured and perceived systolic and diastolic blood pressure in 17 to 18 years

		Actual Systolic Blood Pressure	Actual Diastolic Blood Pressure
Perceived Blood Pressure	Pearson Correlation	.142	.032
	Sig. (2-tailed)	.138	.736
	N	110	110
**. Correlation is significant at the 0.01 level (2-tailed).			

Introspection of table 6 reveals that there was no significant relationship between levels of perception on blood pressure and measured blood pressure in vision and hearing loss school children of age 17 to 18 years.

Discussion

In 13 to 14 years, 1.56 per cent of vision and hearing loss school children in Karnataka had high systolic blood pressure; and 17.19 per cent were pre-hypertensive. In 15 to 16 years, 1.70 per cent came under high category and 25.00 per cent were pre-hypertensive. In 17 to 18 years, 2.73 per cent had high systolic blood pressure and 44.55 per cent were pre hypertensive. The ill effects of high blood pressure are a known fact in the health and fitness research. High systolic blood pressure may be a threat leading to other health compilations in future. A far as diastolic blood pressure is concerned; the results are alarming. In 13 to 14 years, 9.38 per cent had high diastolic blood pressure and

28.13 per cent were pre-hypertensive. In 15 to 16 years, 6.25 per cent came under high category and 43.75 per cent were pre-hypertensive. In 17 to 18 years, 3.64 per cent had high diastolic blood pressure and 43.64 per cent were pre-hypertensive. Similar results were found in a study by (Kidy, *et. al.,* 2014) prevalence and risk factors for high blood pressure among school children in central Uganda. Chirag,*et al.,* 2013 [3] found out the prevalence of hypertension in children and its correlation with age, gender, height and weight of children. All children were in pre-hypertension stage and high blood pressure was directly proportional to increased age, weight, height and body mass index of a child. (Moselakgomo *et. al.,* 2012) [7] evaluated the relationship between body mass index, overweight and blood pressure among South African rural children and adolescents. Childhood and adolescent hypertension and pre-hypertension is important predictor of long term cardio-vascular and neurological disorder. Hypertension may begin in adolescence, perhaps even in childhood. Patel,*et al.,* 2014 [8] determined the prevalence of high normal and elevated blood pressure among school children and to assess associated risk factors.

Conclusion

On the basis of the findings of the present study it is concluded that nearly half of the special school children are found to be deviating from normal blood pressure. Further, the special school children under investigation are unable to significantly perceive their blood pressure accurately.

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