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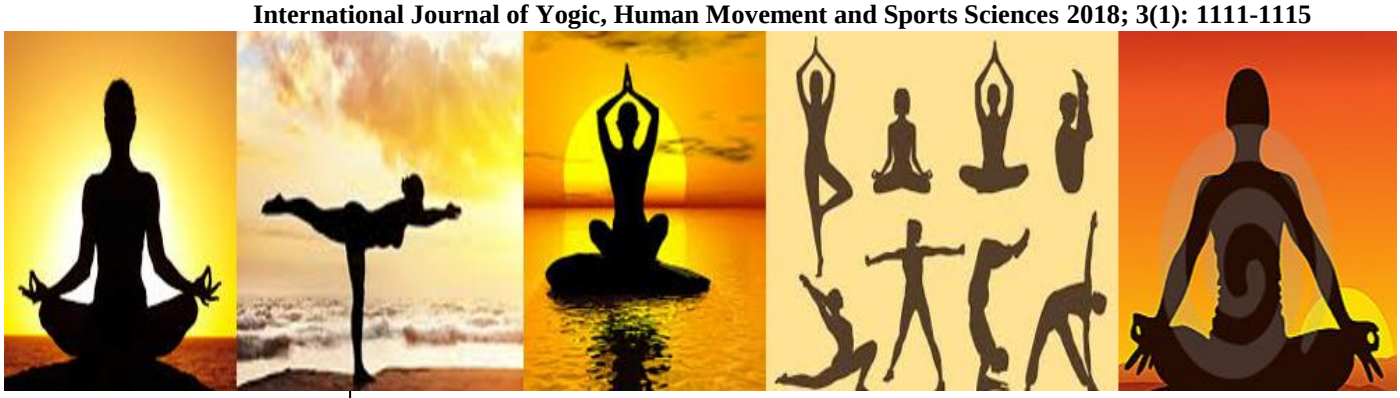

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Poonam Singh
Research Scholar, Poornima University, Jaipur, Rajasthan, India

Pramjeet Singh Ghuman
Professor, Poornima University, Jaipur, Rajasthan, India

Correspondence
Poonam Singh
Research Scholar, Poornima University, Jaipur, Rajasthan, India

Prevalence of hypertension among female school children

Poonam Singh and Pramjeet Singh Ghuman

Abstract
Background: Obesity is increasing rapidly and leads to changes in terms of lifestyle and nutrition, and somehow also leads to under nutrition problems due to more emphasis on reducing weight through dieting that indirectly leads to nutrients deficiency.
Objectives: 1. to find out prevalence of hypertension and pre-hypertension among female school children. 2. To find out association between hypertension and socio-economic status.
Material & Method: A total number of 800 female children (6-10 years) were selected randomly from 4 private and 4 government schools of Jaipur City, Rajasthan. A total of 800 school children with 400 girls and 400 boys were examined. Updated Kuppuswamy socio-economic status questionnaire was used to assess socio-economic status. Automated blood pressure measuring apparatus (OMRON) was used for assessment of hypertension among school children. Data was analysed by using the SPSS version 17.0. The statistical technique used were two-way ANOVA and correlation with level of significance was set at 0.05.
Results: Results revealed that prevalence of hypertension was higher in age group of 7 and 10 years among children of private and government school. The prevalence of pre-hypertension was found as 20.12%, and hypertension was found as 12.87% among children of private school. On the other hand among government school, the prevalence of pre-hypertension was found as 8.87%, and was found as 6% among children. Overall prevalence of hypertension among female children of Private and Government schools. In children was higher among private schools in comparison to government schools. Further, insignificant relation was found between hypertension and socio-economic status among children of both government and private schools.
Conclusion: The prevalence of hypertension was higher in private school children in comparison to the children from government schools. This could be due to the difference in terms of socio-demographic characteristics. Physical inactivity reflects the increasing trend besides with the change in terms of dietary habits that is the major risk factor for pre-hypertension and hypertension. It is suggested from the study that school children should be checked/screened on regular basis for assessment of hypertension for prevention of the complications during their adulthood stage.

Keywords: Hypertension, pre-hypertension, socioeconomic status, prevalence

Introduction
The globalization is bringing more lifestyle modification among children and adolescent, and they are more exposed towards the multiple risk factor with inclusion of obesity and family history of hypertension also.[1] Hypertension is considered as one of the main risk factor for development of cardiovascular disease. It is also considered to be main risk factor for the conditions of aneurysm of artery, stroke, chronic kidney disorder, and peripheral artery disease. The moderate elevation of the blood pressure found to be associated with shorter life expectancy among all age group [2]. Hypertension is considered as an invisible and silent killer which rarely causes any sign or symptom to the affected individual. The symptoms of hypertension are rarely seen in early stages and many individual remain undiagnosed. Due to the risk factors associated with behaviour of an individual such as use of alcohol, unhealthy eating habits, physical inactivity could lead to hypertension. [2] Socio-economic status is considered as an important determinant of health and well-being because it influences people's attitudes, experiences, and exposure to several health risk factors [3]. It is known to be positively associated with better nutrition, housing, schooling, and recreation [4]. In children, socio

economic status would affect a wide array of health and socioemotional outcomes [5]. Socio-economic status is known to be a confounding factor in development of childhood obesity [6]. Some studies were conducted to examine relationship between obesity and socio-economic status among adults, but few studies were conducted to assess the relationship among children of age group 6 to 10 years. The main objective of the present study was to examine and compare the prevalence of hypertension among female children of private and government schools and also to assess relationship between hypertension with the socio-economic status of children.

Material and methods

The study was conducted on total 800 female children. Children were selected randomly from eight schools (4 private and 4 Government schools) of Jaipur city, Rajasthan. The age group of children ranging between 6 to 10 years. Hypertension and socio-economic status were selected as main variables for the study. Informed consent was obtained from all eight schools authorities for collection of data. Automated blood pressure measuring apparatus (OMRON) was used for assessment of hypertension among school children. In 2004, the NHBPEP [7] defined the hypertension as the average diastolic blood pressure and/or systolic blood pressure equal or greater than the 95th percentile for age, height, and gender measured on three visit. Pre-hypertension was defined as the average diastolic blood pressure or systolic blood pressure equal or greater than the 90th percentile but less than 95th percentile. [8] Children were seated in relaxed position. The cuff was placed on their right arm at the heart level. On the day of measurement three readings were taken at 0, 5 and 30 minutes. The average of three readings was taken as blood pressure reading for an individual. [9]

Updated Kuppuswamy socio-economic status questionnaire was used to assess socio-economic status of the children.[10] Data (parent's income, occupation, and education) was collected from record of the respective schools. We examined the prevalence of obesity in each age group. To test the hypothesis descriptive statistics and two-way ANOVA were used as statistical technique to find out the significant difference if any among different variables among different age group of Government and Private school children. The Statistical significance was set at $P< 0{\cdot}05$.

Results

Table 1: Mean and Standard Deviation of Hypertension among Female Private and Government School Children in Different Age Level

SCHOOL	AGE	Mean	Std. Deviation	N
PRIVATE	6 Years	78.45	20.07	80
	7 years	83.45	18.50	80
	8 years	72.31	21.54	80
	9 Years	81.27	20.88	80
	10 Years	77.60	20.61	80
	Total	78.62	20.59	400
GOVERNMENT	6 Years	65.96	20.27	80
	7 years	77.00	20.70	80
	8 years	77.89	20.23	80
	9 Years	77.55	21.11	80
	10 Years	78.54	19.54	80
	Total	75.39	20.82	400
Total	6 Years	72.21	21.06	160
	7 years	80.22	19.83	160
	8 years	75.10	21.02	160
	9 Years	79.41	21.01	160
	10 Years	78.07	20.02	160
	Total	77.00	20.76	800

As shown in Table-I, Means and Standard Deviation of Hypertension in Private School female children of 6 years (78.45± 20.07), 7 years (83.45± 18.50), 8 years (72.31± 21.54), 9 years (81.27± 20.88) and 10 years (77.60± 20.61). Further it was found that 7 year Private school children had greater mean in comparison to 6, 8, 9 and 10 year Private school children.

In other hand, Means and Standard Deviation of Hypertension in Government School female children of 6 years (65.96± 20.27), 7 years (77.00± 20.70), 8 years (77.89± 20.23), 9 years (77.55± 21.11) and 10 years (78.54± 19.54). Further it was found that 8 year Government school children had greater mean in comparison to 6, 7, 9 and 10 year Government school children.

Table 2: Two-way ANOVA of different age level at Private and Government school Female children on Hypertension

Source of Variance	DF	S S	MSS	F – VALUE
School	2086.580	1	2086.580	5.032*
Age	7032.483	4	1758.121	4.240
Interaction	7648.432	4	1912.108	4.612
Error	327562.500	790	414.636	

*Significant at 0.05 level with DF (4, 790) = 2.38

It is evident from Table-II that 6, 7, 8, 9 and 10 year on Hypertension among Private and government school children differed significantly as the obtained F value of 5.032 is much more then tabulated F0.05 (4,790) = 2.38

As the F-ratio was found to be significant, Least Significance Difference (L.S.D.) test of Post-Hoc comparisons was applied to study the significance of difference among 6, 7, 8, 9 and 10 year Private and Government school children and the data pertaining to this is presented in Table-III.

Table 3: Least Significant Difference Post Hoc Test of the Mean of Hypertension at Different Age Level in Private School

6 Year	7 Year	8 Year	9 Year	10 Year	Md	CD At 5% Level
78.45	83.45				5	14.37
78.45		72.31			6.14	14.37
78.45			77.60		0.85	14.37
78.45				78.62	0.17	14.37
	83.45	72.31			11.14	14.37
	83.45		77.60		5.85	14.37
	83.45			78.62	4.83	14.37
		72.31	77.60		5.29	14.37
		72.31		78.62	6.31	14.37
			77.60	78.62	1.02	14.37

*significant at 0.05 level

Table-III revealed that there is significant difference between the paired mean of Hypertension at different Age level at 6 & 7 Year (5); 6 & 8 Year (6.14), 6 & 9 Year (.85); 6 & 10 Year (0.17); 7 & 8 Year (11.14); 7 & 9 Year (5.85); 7 & 10 Year (4.83); 8 & 9 Year (5.29); 8 & 10 Year (6.31); 9 & 10 Year (1.02) respectively. The highest significant paired mean difference was recorded between 7 & 8 Year (11.14) on the other hand the lowest significant paired mean difference was recorded between 6 & 10 Year (0.17). The graphical representation of mean of Hypertension at different Age Level has been presented in Figure-I.

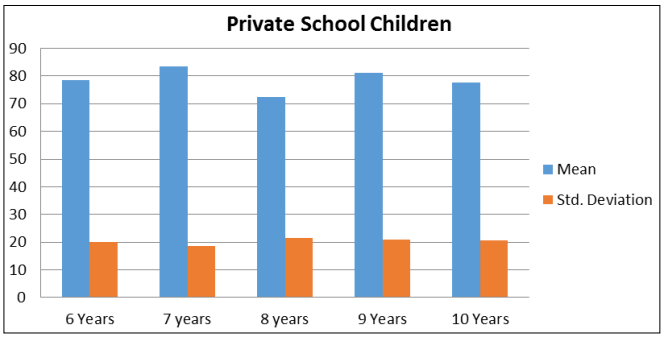

Fig 1: Mean of Hypertension at Different Age Level among Private School children

Table 4: Least Significant Difference Post Hoc Test of the Mean of Hypertension at Different Age Level in Government School

6 Year	7 Year	8 Year	9 Year	10 Year	Md	CD At 5% Level
65.96	77.00				11.04	14.37
65.96		77.89			11.3	14.37
65.96			77.55		11.59	14.37
65.96				78.54	12.58	14.37
	77.00	77.89			0.89	14.37
	77.00		77.55		0.55	14.37
	77.00			78.54	1.54	14.37
		77.89	77.55		0.34	14.37
		77.89		78.54	0.35	14.37
			77.55	78.54	0.99	14.37

*significant at 0.05 level

Table-IV revealed that there is significant difference between the paired mean of Hypertension at different Age level at 6 & 7 Year (11.04); 6 & 8 Year (11.3), 6 & 9 Year (11.59); 6 & 10 Year (12.58); 7 & 8 Year (0.89); 7 & 9 Year (0.55); 7 & 10 Year (1.54); 8 & 9 Year (0.34); 8 & 10 Year (0.35); 9 & 10 Year (0.99) respectively. The highest significant paired mean difference was recorded between 6 & 10 Year (12.58) on the other hand the lowest significant paired mean difference was recorded between 7 & 9 Year (0.55). The graphical representation of mean of Hypertension at different Age Level has been presented in Figure II.

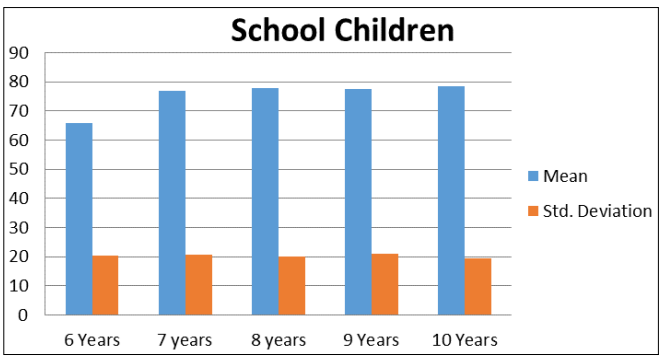

Fig 2: Mean of Hypertension at Different Age Level among Government School children

Table 5: Least Significant Difference Post Hoc Test of the Mean of Hypertension at Different Age Level in Total Private and Government School Children

6 Year	7 Year	8 Year	9 Year	10 Year	Md	CD At 5% Level
72.21	80.22				8.01*	7.18
72.21		75.10			2.89	7.18
72.21			79.41		7.2	7.18
72.21				78.07	5.86	7.18
	80.22		79.41		0.81	7.18
	80.22			78.07	2.15	7.18
	80.22	75.10			5.12	7.18
		75.10	79.41		4.31	7.18
		75.10		78.07	2.7	7.18
			79.41	78.07	1.34	7.18

*significant at 0.05 level

Table-V revealed that there is significant difference between the paired mean of Hypertension at different Age level at 6 & 7 Year (8.01); 6 & 8 Year (2.89), 6 & 9 Year (7.2); 6 & 10 Year (5.86); 7 & 8 Year (0.81); 7 & 9 Year (2.15); 7 & 10 Year (5.12); 8 & 9 Year (4.31); 8 & 10 Year (2.7); 9 & 10 Year (1.34) respectively. The highest significant paired mean difference was recorded between 6 & 7 Year (8.01) on the other hand the lowest significant paired mean difference was recorded between 7 & 8 Year (0.81). The graphical representation of mean of Hypertension at different Age Level has been presented in Figure III.

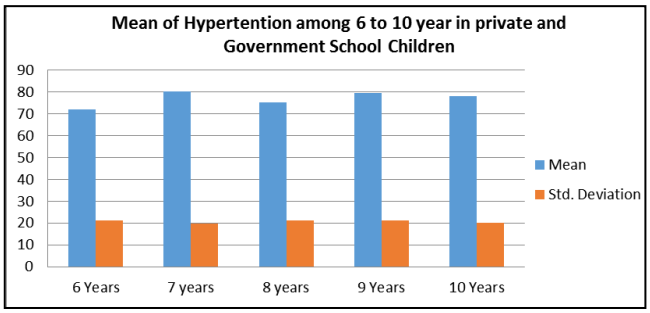

Fig 3: Mean of Hypertension at Different Age Level among Private and Government School children

Table 6: Correlation between Hypertension and Socio Economic Status among children of Government and Private School

School	Correlation coefficient
Private School	-.009
Government School	-.003

* Significant at.05 level r.05 (800) = 135

Table-VI clearly indicates that there exists an insignificant relationship between Hypertension and Socio Economic Status among children of Government and Private schools as the correlation co-efficient values were found lower than the tabulated values at 05 level of significance.

Discussion

In the present study, it is revealed that children of Government school and low socioeconomic status group categorically had less Hypertension in comparison to Private school students and 8 year Government school children had greater Hypertension in comparison to 6, 7, 9 and 10 year Government school children. Further it was found that 7 year Private school children had greater Hypertension in comparison to 6, 8, 9 and 10 year Private school children. The finding was supported by the study conducted by D. Kishorkumar (2016) and G Anuradha (2017). This finding would be attributed to the fact that the high socio-economic status group with higher income and disposable money to afford luxury in terms of comfort living, outdoor eating etc. Hence, the affordability factors due to high income would be the associated causal factor that students of Private and high socio-economic status group are more susceptible to overweight. The findings of the study are in partial consonance with research study conducted by finding of Khadilkar *et al*. (2011). It is also revealed that an insignificant relationship exists between Hypertension and Socio Economic Status among children of Government and Private Schools, the result was strongly supported by the studies conducted by Jasmine S Sundar, *et al*. (2013); Souza, *et al*. (2016); and Dr. S. A. Sardar Sulthana, *et al*. (2017). The prevalence of hypertension was alarming in both groups of schools. Therefore, proper nutritional diet and regular physical activity should be provided to children with hypertension problem.

Conclusion

In terms of Hypertension, significant difference was found between Government and Private school female children. The prevalence of Hypertension was higher in age group of 7 years among female children of Private schools, on the other hand 10 years among female children of Government schools. In the private school, the prevalence of pre-hypertension was found as 20.12%, and hypertension was found as 12.87% among children. On the other hand among government school, the prevalence of pre-hypertension was found as 8.87%, and was found as 6% among children. Overall prevalence of hypertension among children was higher among private schools in comparison to government schools. Further, insignificant relation was found between hypertension and socio-economic status among children of both government and private schools. This could be due to the difference in terms of socio-demographic characteristics. Increasing prevalence of pre-hypertension and hypertension was might be due to the childhood obesity as well as the growing awareness of diseases. Awareness about hypertension was very low among the participants and their parents. Physical inactivity reflects the increasing trend besides with the change in terms of dietary habits that is the major risk factor for pre-hypertension and hypertension. It is suggested from the study that school children should be checked/screened on regular basis for assessment of hypertension for prevention of the complications during their adulthood stage.

Recommendations

1. There is a need to create awareness among school students particularly in adolescent age group regarding hypertension and its complications.
2. School authorities should be active in organization of the screening programme for hypertension.
3. Awareness pertaining to pre-hypertension and hypertension should be provided to the children and their parents.
4. Number of hours spent on the Games and Sports activities should be increased among the school children on daily basis. There should be close observation mainly on children with pre-hypertension and hypertension conditions by the PET, coaches, and instructors during the Sports class period.
5. Parents should be counselled and motivated for use of healthy heating habits mong their family and especially among children.
6. The Sports or Physical Education teacher should develop some physical activity programme on the basis of the health status of the children suffering from the hypertension condition to control or manage it.
7. Early intervention and detection of hypertension is more important, so that children and their parents should have health check-up on regular basis.
8. There should be provision of regular health check-up in the schools to monitor health status of children. Special attention should be given to children overall nutrition.

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