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Epidemiological Study of Prevalence of Hypertension and Obesity in School going Children of Kamrup District of Assam

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Abstract: ***The present study was conducted to determine the prevalence of hypertension and obesity in the school going children of kamrup district of Assam in India and to know their relationship with the various influencing factors. Five thousand school children of both the sexes in the age group of five to sixteen years formed the study material. Parameters were recorded and compared with standard chart. Significant number showed that there is strong relationship between physical activity, intake of junk food and family history (p<0.0001). Greater portion of children in the society are found to be hypertensive and obese who require further follow up to determine risk of hypertension and obesity. Awareness among the public should to be raised for taking balance diet and to modify their life style and increase physical activity.***

Keywords: School going age, Hypertension, Obesity, Junk food, Physical inactivity

1. Aims and Objects

1) To study the prevalence of obesity and hypertension in school-going children
2) To know their relationship with various influencing factors

2. Materials and Methods

Community based study in school going children in Kamrup district of Assam, both in urban and rural areas to study the prevalence of hypertension and obesity among them and to know their relationship with various influencing factor. Five thousand school children of both sexes in the age group of 5 to 16 years formed the study material. The age was recorded in completed years. The weight (in kg) was taken by a standardized weighing machine while height was measured using a calibrated bar. For diagnosis of obesity, the body mass index (BMI) was calculated by the following formula:

$$\frac{\text{Weight (in kg)}}{\text{Height (m}^2\text{)}}$$

The American Obesity Association defines those children above the95thpercentile as "obese" which corresponds to a BMI of 30. At the95thpercentile or above, they are "over-weight". At the 85th percentile and above, children are "risk for over-weight". The value was compared with the standard chart as per CDC .Blood pressure (BP) measurement was taken using a mercury sphygmomanometer as per the recommendations of American heart association. The average of three consecutive readings was taken as the blood pressure of the child. "Hypertension" was diagnosed if the blood pressure was more than the 95th percentile for the height by gender and age and the blood pressure between 90-95th percentiles for the height by gender and age was considered as "Pre-Hypertension". Data compared with standard charts. A pilot questionnaire was developed which consists of five sections:

Section-I: Assessed demographic information – name, age, Gender and height (In meters) weight (in kg) and blood pressure (in mm Hg)

Section–2: Measured socio-economic status on the basis of area of residence, occupation of parents, school fee structure, type of house etc

Section-3: Evaluated dietary intake including questions over number, quantity and type of regular meals taken and junk foods, A question also assessed parental awareness of child's Nutritional status

Section-4: Assessed the level of physical activity including level of physical Activity including questions on number of hours of watching Television / playing video games per day, number of times a sport is played per week (defined as>30 minutes of activity) and punctuality in school physical education classes.

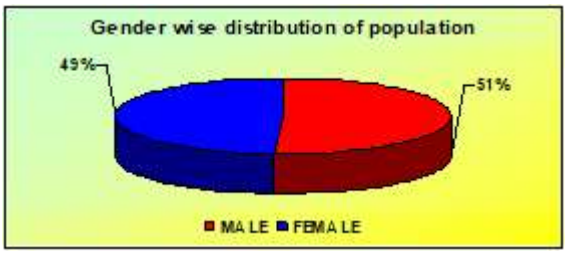
Section-5: Assessed the family history of hypertension and obesity by enquiring from the respective parents and teachers. Data analysis was done using standard charts and "Chi-square" technique. A total of 5,000 children in the age group of 5 to 16 years were assessed from September 2014 to December 2016.

3. Results and Observations

The below table shows gender-wise distribution of population

Table 1

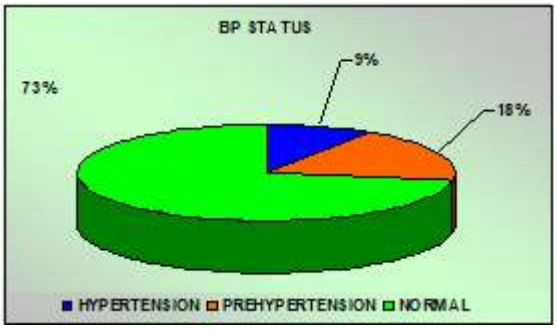
	NOS	Percentage
Male	2542	51%
Female	2458	49%



The below-mentioned table shows BP status in the entire population. Out of 5,000 population, 464 (9%) were hypertensive, 909 (18%) were pre-hypertensive and 3,627 (73%) were normotensive

Table 2

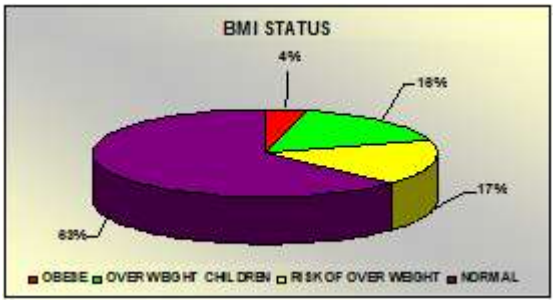
	Total	Percentage
Hypertension	464	9%
Prehypertension	909	18%
Normal	3627	73%



The below table shows the BMI status in the entire population, Out of 5000 population, 200 were obese (4%), 798 (16%) were over-weight, 852 (17%) were at the risk of over-weight and 3.150 (63%) were of normal BMI

Table 3

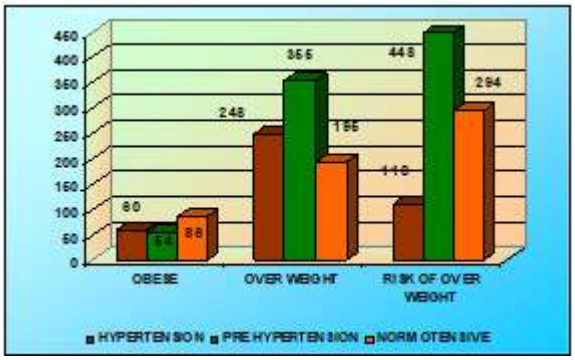
	NOS	*Percentage*
Obese	200	4%
Over Weight Children	798	16%
Risk Of Over Weight	852	17%
Normal	3150	63%



The below table shows the relationship between BMI and blood pressure. Out of 200 obese children, 60 were hypertensive, 54 were in pre-hypertensive range and 86 were normotensive. Out of 798 over-weight children, 248 were hypertensive, 355 were pre-hypertensive and 195 were normotensive. Out of 852 to be at risk of over-weight, 110 were hypertensive, 448 were pre-hypertensive and 294 were normotensive. Out of 3,150 normal BMI, 46 were hypertensive, 52 were pre-hypertensive and 3052 were normotensive.

Table 4

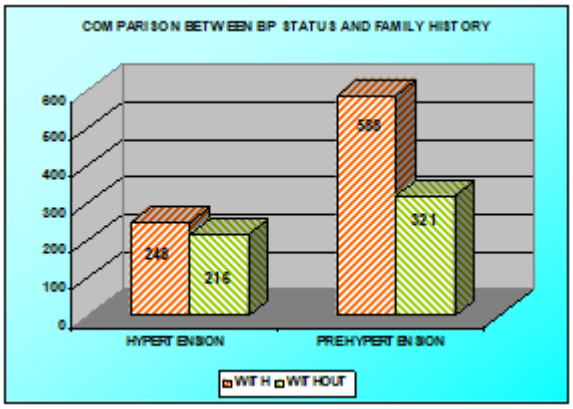
BMI Status	BP STATUS		
	Hypertension	Pre- Hypertension	Normotensive
Obese	60	54	86
Over Weight	248	355	195
Risk of Over Weight	110	448	294
Normal Bmi	46	52	3052



The below table shows the relationship between the BP status and family history of hypertension. Out of 464 hypertensive, 248 had strong family history of hypertension and 216 had no family history of hypertension. Out of 909 pre-hypertensive, 588 had family history of hypertension and 321 had no family history of hypertension

Table 5

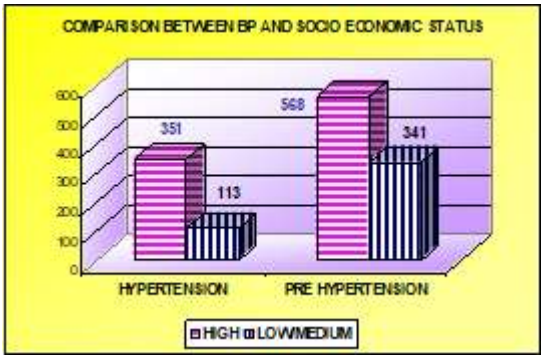
BP Status	Family History	
	With	Without
Hypertension	48	216
Pre Hypertension	588	321



The below table shows the relationship between BMI status and family history of obesity. Out of 200 obese, 117 had strong family history. Out of 798 over-weight, 592 had family history of obesity and out of 852 to be at risk of over-weight, 527 had family history of obesity.

Table 6

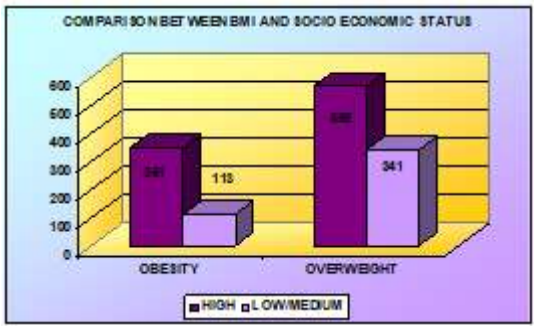
BMI Status	Family History	
	With	Without
Obesity	117	83
Over Weight	592	206
Risk of Overweight	527	325



The below table shows the relationship between socio-economic status and BP status. Out of 464 hypertensive, 351 belongs to high socio-economic status.

Table 7

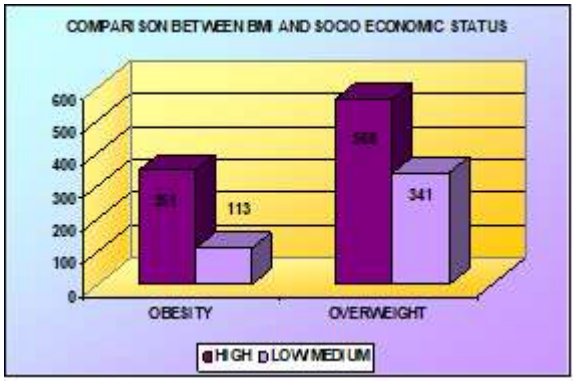
BP Status	Socio Economic Status	
	High	Low/Medium
Hypertension	351	113
Pre Hypertension	568	341



The below table shows the relationship between socio-economic status and BMI status. Out of 464 obese, 351 belong to high socio-economic class. Out of 909 over-weight, 568 belong to high socio economic status and out of 852 to be at risk of over-weight, 548 belong to high socio-economic status

Table 8

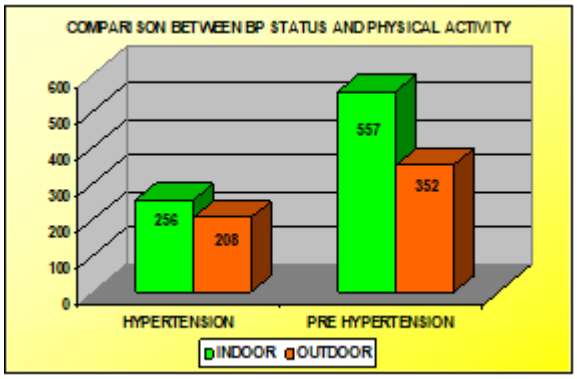
BMI Status	Socio Economic Status	
	High	Low/Medium
Obesity	351	113
Overweight	568	341
Risk Of Overweight	548	304



The below chart shows the relationship of physical activity with BP status. Out of 464 hypertensive, 256 were involved more in indoor activities and 208 in outdoor activities. Out of 909 pre-hypertensive, 557 were involved more in indoor activities and 352 in outdoor activities.

Table 9

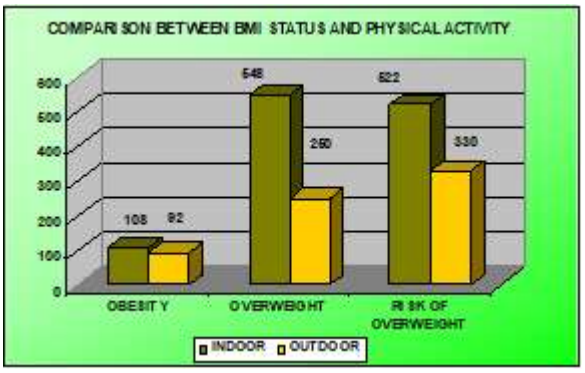
BP Status	Physical Activity	
	Indoor	Outdoor
Hypertension	256	208
Pre Hypertension	557	352



The below chart shows the relationship of BMI status with physical activity. Out of 200 obese, 108 were involved in indoor activities and 92 in outdoor activities. Out of 798 over-weight, 548 were involved in indoor activities and 250 in outdoor activities. Out of 852 risk of over-weight, 522 were involved in indoor activities and 330 were involved in outdoor activity

Table 10

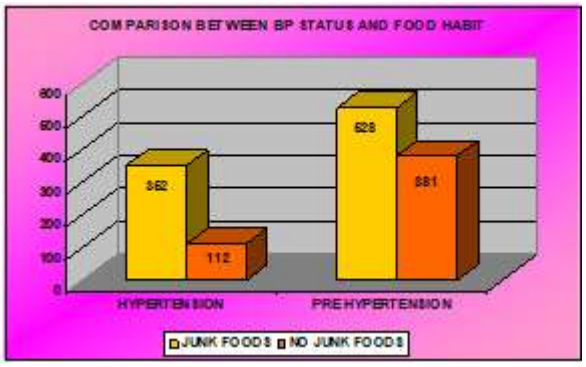
BMI Status	Physical Activity	
	Indoor	Outdoor
Obesity	108	92
Overweight	548	250
Risk of Overweight	522	330



The below chart shows the relationship between food habit and BP status. Out of 464 hypertensive, 352 were involved more taking junk foods. Out of 528 pre-hypertensive, 528 were involved more in taking junk food.

Table 11

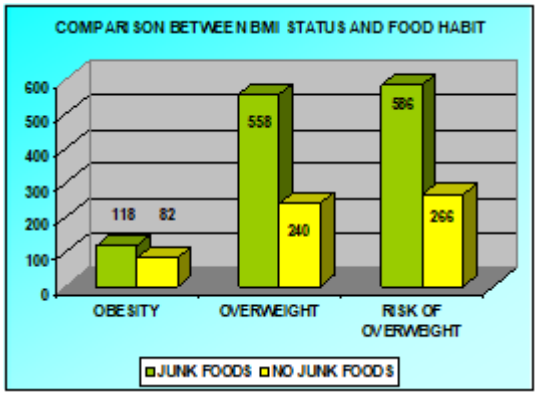
BP Status	Food Habit	
	Junk Foods	No Junk Foods
Hypertension	352	112
Pre Hypertension	528	381



The below chart shows the relationship between BMI and food habit. Out of 200 obese, 118 took junk foods. Out of 798 over-weight, 558 took more junk foods and out of 852 to be at risk of over-weight, 586 took more junk foods

Table 12

BMI Status	Food Habit	
	Junk Foods	No Junk Foods
Obesity	118	82
Overweight	558	240
Risk Of Overweight	586	266



4. Discussion

The present study was conducted in school going children aged 5 to 16 years of Kamrup district of Assam to evaluate the prevalence of obesity and hypertension and their relationships with various risk factors. The study was carried out in the Kamrup district of Assam over a period from September 2014 to December 2016.A total number of 5000 students in school going aged between 5 to 16 years were included in the study and standard criteria were taken for calculation of BMI and blood pressure. The study showed a total of 464 (9%) hypertensive, 909 (18%) pre-hypertensive, 200 (4%) obese, 798(16%) over-weight and 852 (17%) to be at risk of over-weight out of 5000 population. Out of 464 hypertensive, 60 were obese, 248 were over-weight and 110 were at risk of over-weight. Out of 909 pre-hypertensive, 54 were obese, 355 were over-weight and 448 were at risk of over-weight. This shows there is significant increase in prevalence of hypertension and pre-hypertension with increased BMI (P<0.0001). Out of total 464 hypertensive, 248 had strong family history of hypertension and of the total 909 pre-hypertensive, 588 had strong family history of hypertension. Out of 200 obese, 117 had family history of obesity; Out of 798 over-weight, 592 had family history of obesity and out of 852 to be at risk of over-weight, 527 had strong family history of obesity. Hence, there is strong relationship between family history of hypertension and obesity with prevalence of hypertension and obesity (P<0.0001).Out of 464 hypertensive, 351 belongs to high socio economic status; Out of 909 pre-hypertensive, 568 belongs to high socio economic status. Out of 200 obese, 117 belongs to high socio economic status; Out of 798 over-weight, 438 belongs to high socio economic status; Out of 852 to be at risk of over-weight, 548 belongs to high socio economic status. Hence, there is significant relationship between high socio economic status with BMI and hypertension (P<0.0001).Out of 464 hypertensive, 256 were involved mostly in indoor activities and 352 were involved in taking junk food items. Out of 909 pre-hypertensive, 557 were involved mostly in indoor activities and 528 involved in taking junk food items. Out of 200 obese, 108 were involved mostly in indoor activities and 118 were involved in taking junk foods; Out of 798 over-weight, 548 were involved mostly in indoor activities and 558 were involved in taking junk foods; out of 852 to be at risk of over-weight, 552 were involved mostly in indoor activities and 586 were involved in taking junk food items. Hence, there is a strong relationship between physical inactivity with prevalence of hypertension (P=0.029) and obesity (P<0.0001). Also, there is strong relationship between intake of junk food items with prevalence of hypertension and obesity (P=0.011 and P<0.0001).The findings of the present study revealed that significant proportion of children were hypertensive and obese. Even a greater proportion of children were in pre-hypertensive and in risk of over-weight who needs further follow up to determine the risk of hypertension and obesity in future. Significant risk factors of hypertension and obesity were family history, food habits and physical inactivity. It is evident that obesity in children is a risk factor for later coronary disease. In order to prevent or decrease the target organ damage it is necessary to modify the risk factors in children. The children belonging to hypertensive families should be targeted for primary prevention along with dietary and life style modification. Integrated approaches that promote intake of a balanced diet and increased physical activity are to be considered in the management protocol and drug therapy when required.

5. Conclusions

Greater portion of children in the society are found hypertensive and obese who required further follow up to determine the risk of obesity and hypertension. The children belonging hypertension and obesity should be targeted to modify their life-style in dietary habits

Obesity in children is a risk factor for coronary heart disease in later life. Awareness among the public should be raised for taking balanced diet & to modify their life-style. The life-style system of obese and Hypertensive children should be approached for primary prevention to intake of balance diet and increased physical activity

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