ORIGINAL RESEARCH ARTICLE

Study on lifestyle risk factors in school children and its relationship to their mothers'

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Abstract

Introduction: Globally Non Communicable Diseases (NCDs) are a major cause of morbidity and mortality. They occur after exposure to a set of lifestyle risk factors. Obesity and hypertension among adults has its antecedents during childhood .When governments are assessing ways to generate finances for management of NCDs, it is worthwhile to give due importance to preventive services. **Objectives:**To study relationship of lifestyle risk factors (BMI & BP) between school children and their mothers and to study the factors associated with BMI& BP. **Methodology:** School based cross sectional study done among 225 students and their mothers in three settings,rural,tribal and urban. Students and mothers were interviewed using questionnaire in local language after obtaining consent. Height, Weight and BP measured using standardized instruments. Data tabulated using MS excel , analyzed using SPSS version 20. **Results:** There was statistically significant association between BMI of mother and student.Association between BP of mother and student was not statistically significant. Association between BMI and BP was statistically significant among mothers and students. Considering BMI, statistically significant association was noted for physical activity, use of non-smoking tobacco and desire to change weight. Considering BP, desire to change weight, use of non-smoking tobacco and intake of food from outside showed statistically significant association. **Conclusion:**Maintaining normal BMI is important as it is found to affect next generation. Increased BMI is associated with abnormal BP values, which is a precursor for life style diseases. Hence control of BMI and BP is essential to protect future generations from lifestyle diseases.

Key-words:BMI, BP, lifestyle risk factors, non-communicable diseases

Introduction

Globally Non Communicable Diseases (NCDs) are a major cause of morbidity and mortality. Of the 57 million global deaths in 2008, 36 million (63%) were due to NCDs.[1] The prevalence of NCDs are showing an upward trend in most countries. A progressive rise in the disease pattern of NCD foretells a serious public health issue. Most NCDs occur after a prolonged exposure to a set of lifestyle risk factors. The major risk factors for NCDs are sedentary lifestyle, unhealthy diet, tobacco and alcohol abuse. A large percentage of NCDs are preventable through the changes in these factors. Behavioral risk factors start in childhood and continue into adulthood.

India carries the greatest burden of NCDs globally and Indians develop cardiovascular diseases (CVDs) earlier with more severity when compared to Westerners.[2] India is experiencing a rising burden of NCDs, both in urban and rural population, with considerable loss in potentially productive years of life. Childhood and adolescent obesity has emerged as an epidemic in countries that are in rapid epidemiological transition, and India is no exception. According to a study published in Lancet, India is just behind US and China among the countries with highest number of obese people.[3] 50-80% of the obese children will continue to be obese adults. A study done on Indian school going children suggests that the prevalence of overweight& obesity varies remarkably with different socioeconomic development levels.[4] Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India.[5] A community based survey carried out by ICMR during 2007-2008 to identify the risk factors for NCDs reported a

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prevalence of hypertension varying from 17-21% in all the states.[6]

A study done in Kerala revealed a high prevalence of overweight (16%) and obesity (7%).[7] Kerala stands second in the country after Punjab in child obesity.[8] Increased prevalence of overweight and obesity emphasizes the need of early recognition of excessive weight gain and early intervention. The prevalence of hypertension among the Kerala State's population was found to be 38.9 per cent in the preliminary analysis of data collected by the Kerala chapter of Cardiological Society of India (CSI). In rural Kerala, traditional risk factors were strongly associated with MI and stroke.

Metabolic risk factors such as obesity are starting to appear at early ages. Body Mass Index (BMI) is the best tool for screening overweight and obesity in children and adults and correlates with all-cause mortality.[9] Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood. Public health approaches can effectively slow down the development of atherosclerosis in young people, thereby reducing the likelihood of future epidemics of cardiovascular events. Early detection is key to improving outcomes of CVDs. Prevention of obesity should begin in early childhood. Hypertension (HT) is a major NCD risk factor especially related to CVDs. BP levels have been shown to be positively and progressively related to risk of stroke and CVDs. There is increasing evidence that adult hypertension has its antecedents during childhood and predicts adult BP. Hence tracking of BP can be applied in identifying children at risk of developing hypertension at a future date.

As the magnitude of CVDs continue to accelerate, the pressing need for increased awareness and for strong focused responses is increasingly needed. In the absence of preventive strategies, increasing number of people will succumb to heart attacks due to continuing exposure to risk factors. Hence the studies of life style risk factors are important. There is only limited data on the relationship of obesity and hypertension between mothers and their children. Hence the objective of this study was to compare two important lifestyle risk factors(BMI and BP) between school children in the age group 12-15 years & their mothers, in different socioeconomic backgrounds and to study the factors associated with BMI & BP.

Materials and methods

A school based cross sectional study was done in 3 schools selected by stratified random sampling based on different settings (Rural, Tribal and Urban) during June & July 2015 in Palghat district, Kerala State. Sample size was calculated based on a study done in Bhilai .[10] Accordingly, 225 students (75 students from each school) and their mothers were examined.25 students each from 8th (12-13 yrs), 9th(13-14 yrs)and 10th(14-15yrs)standards of the three schools were taken for the study.Children in

age group of 12-15 years attending school on arranged day of examination along with mothers were included in the study. Those who did not give consent and those not accompanied by mothers were excluded. Face to face interview with student and mother was conducted after getting informed consent using questionnaire adapted from WHO STEPS NCD risk factors survey in local language. Height , weight and BP of both student and mother were measured using standardized instruments. The cuff size was used according to the arm circumference of mother and student. For an arm circumference of 22 to 26 cm, the cuff size of 12 x 22 cm and for 27 to 34 cm, cuff size of 16 x 30 cm was used. Two BP measurements were done and the average was taken. Data was tabulated using MS Excel and analyzed using SPSS version 20. p value of<0.05 was considered to be statistically significant.

Results

Demographic characteristics of the study population are shown in Table No.1. The average age of mothers ranged from 29 to 50 years, with a mean age of 36.68 ± 3.93.
The behavioural risk factors of study population are shown in Table No.2.

Table No.I   Demographic variables of study population

Variable	Rural	Tribal	Urban
Gender of student			
Male	38(50.7)	36(48)	23(30.7)
Female	37(49.3)	39(52)	52(69.3)
Age of mothers*			
<37 years	52(69.3)	52(69.3)	28(37.3)
≥37 years	23(30.7)	23(30.7)	47(62.7)

*mean age 37 years

BMI of mothers classified according to WHO Asian BMI cut-off points. BMI of students was classified based on Revised Indian Association of Pediatrics growth charts.[11] (Table No.3) 36% of mothers in tribal area were underweight. 82.6% of mothers in urban area and 68% in rural area were overweight and above. Among students, 80% of tribals were underweight. Only 4% of tribals belonged to overweight and obese category, while 24% in urban area belonged to that category. Majority of mothers in rural, tribal and urban areas had above normal value for BP. Among students, 16% in urban area, 9.3%in tribal area and 5.3% in rural area had above normal values for BP. Considering previous BP measurements, none of the tribal students have had measured their BP before, while only 1.3% of mothers have had their BP measured before. Considering BMI, there was statistically significant association between BMI of mother and student (p ,0.001). (Table No.4)Association between BP of mother and student was not statistically significant. (p, 0.332)

Table No. 2 Behavioural risk factors of study population

Variable	Rural	Tribal	Urban
MOTHERS			
Intake of food not prepared at home(per week)			
Never	66(88)	72(96)	37(49.4)
Once a week	9(12)	1(1.3)	37(49.3)
More than once a week	0	2(2.7)	1(1.3)
Engagement in vigorous physical activity as part of work			
Yes	46(61.3)	72(96)	46(61.3)
No	29(38.7)	3(4)	29(38.7)
Desire to change weight			
Yes	44(58.7)	6(8)	46(61.3)
No	31(41.4)	69(92)	29(38.7)
Use of nonsmoking tobacco			
Yes	0	55(73.3%)	0
No	75(100%)	20(26.7%)	75(100%)
STUDENTS			
Intake of food not prepared at home(per week)			
Never	59(78.6)	72(96)	41(54.7)
Once a week	13(17.3)	3(4)	28(37.3)
More than once a week	3(4)	0	6(8)
Engagement in vigorous games			
Yes	55(73.3)	52(69.3)	28(37.3)
No	20(26.7)	23(30.7)	47(62.7)
Desire to change weight			
Yes	42(56)	7(9.3)	41(54.7)
No	33(44)	68(90.6)	34(45.3)
Use of non-smoking tobacco			
Yes	0	2(2.7%)	0
No	75(100%)	73(97.3%)	75(100%)

Table No.3. BMI &BP of study population

Variable	Rural	Tribal	Urban	p Value
BMI of MOTHERS				
Underweight	3(4)	27(36)	2(2.7)	<0.001
Normal	21(28)	33(44)	11(14.7)	
Overweight& above	51(68)	15(20)	62(82.6)	
BMI of STUDENTS				
Underweight	51(68)	60(80)	37(49.3)	0.001
Normal	16(21.3)	12(16)	20(26.7)	
Overweight& above	8(10.7)	3(4)	18(24)	
BP of MOTHERS				
Normal value	21(28)	21(28)	16(21.3)	0.559
Above normal value	54(72)	54(72)	59(78.7)	
BP of STUDENTS				
Normal value	71(94.7)	68(90.7)	63(84)	0.093
Above normal value	4((5.3)	7(9.3)	12(16)	

Table No.4 Association between BMI of mother and student

BMI of STUDENT	BMI of MOTHER		
	Underweight	Normal	Overweight&above
Underweight	28(18.9)	50(33.8)	70(47.3)
Normal	3(6.2)	10(20.8)	35(72.9)
Overweight&above	1(3.4)	5(17.2)	23(79.3)

Table No. 5 Association between BMI & BP

BMI of mother	BP of mother		p value
	Normal BP	Above normal BP	
Underweight	13(40.6)	19(59.4)	
Normal	24(36.9)	41(63.1)	0.001
Above normal	21(16.4)	107(83.6)	

BMI of student	BP of Student		
	Normal BP	Above normal BP	
Underweight	141(95.3)	7(4.7)	<0.001
Normal	43(89.6)	5(10.4)	
Above normal	18(62.1)	11(37.9)	

The association between BMI & BP of both mother and student was statistically significant.(p.0.001 & p <0.001)(Table No. 5)

Considering factors associated with BMI ,among mothers, statistically significant association was noted for age(p=0.005),engagement in vigorous physical activity as part of work(p <0.01),duration of sleep(p <0.01) ,use of non-smoking tobacco(<0.001) and above normal BP(p <0.01). Regarding BMI of students, engagement in vigorous games(p <0.01) ,desire to change weight(p <0.011) and above normal BP(p <0.001) showed a statistically significant association.(Table No.6)

Considering the factors associated with BP of mothers, desire to change the weight(0.038) and use of non-smoking tobacco(p=0.039) showed a statistically significant association while among students intake of food not prepared at home(0.037) showed a significant association. (Table No.7)

On binary logistic regression above normal BP, physical inactivity, use of smokeless tobacco, less duration of sleep are predictors of increased BMI of mothers while above normal BP and no desire to change weight are predictors of increased BMI of students. Regarding BP, for mothers the age and for students no engagement in vigorous games are predictors .(Table No. 8)

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Discussion In the present study it is seen that there is a statistically significant association between BMI of mother and BMI of students regardless of rural, tribal or

also showed a significant association with BP and intake of food not prepared at home.[6]

Table No.6 Factors associated with BMI of mothers & students

Variables	BMI OF MOTHERS			p value
	Underweight	Normal	Overweight& above	
Age of mother				
<37 years	25(18.9)	43(32.6)	64(48.5)	0.005
≥37 years	7(7.5)	22(23.7)	64(68.8)	
Engagement in vigorous physical activity as a part of work				
Yes	28(17.1)	58(35.4)	78(47.6)	<0.01
No	4(6.6)	7(11.5)	50(82)	
Duration of sleep				
5 -7 hours	5(4.3)	26(22.2)	86(73.5)	<0.01
>7 hours	27(25)	39(36.1)	42(38.9)	
Use of non-smoking tobacco				
Yes	22(40)	26(47.3)	7(12.7)	<0.001
No	10(5.9)	39(22.9)	121(71.2)	
BP of mother				
Normal BP	13(40.6)	24(36.9)	21(16.4)	<0.01
Above normal BP	19(59.4)	41(63.1)	107(83.6)	
BMI OF STUDENTS				
Gender				
Male	70(72.2)	16(16.5)	11(11.3)	0.2
Female	78(60.9)	32(25)	18(14.1)	
Engagement in vigorous games				
Yes	105(77.8)	20(14.8)	10(7.4)	<0.01
No	43(47.8)	28(31.1)	19(21.1)	
Desire among students to change their weight				
Yes	53(58.9)	18(20)	19(21.1)	0.011
No	95(70.4)	30(22.2)	10(7.4)	
BP of student				
Normal BP	141(95.3)	43(89.6)	18(62.1)	<0.001
Above normal BP	7(4.7)	5(10.4)	11(37.9)	

Table No.7 Factors associated with BP of mothers & students

Variables	BP OF MOTHER		p value
	Normal BP	Above normal BP	
Age (*mean age 37 years)			
<37 years*	45(34.1)	87(65.9)	0.001
≥37 years	13(14)	80(86)	
Type of family			
Nuclear	36(24.8)	109(75.2)	0.661
Joint	22(27.5)	58(72.5)	
Engagement in vigorous physical activity as a part of work			
Yes	44(26.8)	120(73.2)	0.554
No	14(23)	47(77)	
Desire among mothers to change their weight			
Yes	18(18.8)	78(81.2)	0.038
No	40(31)	89(69)	
Use of non-smoking tobacco			
Yes	20(36.4)	35(63.6)	0.039
No	38(22.4)	132(77.6)	
BP OF STUDENT			
Gender			
Male	85(87.6)	12(12.4)	0.354
Female	117(91.4)	11(8.6)	
Engagement in vigorous games			
Yes	125(92.6)	10(7.4)	0.088
No	77(85.6)	13(14.4)	
Intake of food not prepared at home(per week)			
Never	158(91.9)	14(8.1)	0.037
Once a week	38(86.4)	6(13.6)	
More than once a week	6(66.7)	3(33.3)	
Desire among students to change their weight			
Yes	80(88.9)	10(11.1)	0.719
No	122(90.4)	13(9.6)	

urban backgrounds. A study done by Poonam Marwah in Patiala, Punjab also has reported that a family history of obesity is a significant risk factor for obesity in children.[12] Another study by Ramesh K reported a strong association of overweight with family history.[13]

Gender was not significantly associated with BMI of students according to this study. A study done by A Jahnavi among high school students of Hyderabad showed that the prevalence of overweight was higher in boys.[14] Another study done by Shiny George in Kerala reported that BMI was higher in boys than girls.[7] It also recommended that consumption of high fat and high energy food should be avoided by children. This study

In this study, students with BMI of underweight category were found to be more in rural area than urban area, while overweight was more in urban students when compared to students in rural area. A study done by P Alok in Surat pointed out the increasing prevalence of overweight and obesity in urban adolescents.[15]

Desire to change weight had statistically significant association with BMI of students as shown in this study. A study reported by R P Menon mentions that creating awareness about risks of overweight should remain a priority area of intervention.[16] Another study done by

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Ambili Remesh in Trivandrum, Kerala concluded that creating awareness among school goers on the negative health effects of obesity is the key for maintaining good health.[17]

Table No.8 Predictors of BMI&BP -binary logistic regression

Variable	Adjusted OR	95%CI
BMI of Mother		
Above normal BP	2.6	1.32-5.12
Physical inactivity	2.9	1.33-6.6
Use of smokeless tobacco	8.4	3.16-22.3
Less duration of sleep(<7hours)	2.3	1.09-4.76
BMI of student		
Above normal BP	16.42	5.25-51.31
No desire to change weight	6.21	1.19-32.26
BP of mother		
Age ≥37 years	1.7	1.02-2.92
BP of student		
No engagement in vigorous games	2.6	1.16-5.9

BMI & engagement of students in vigorous games were associated in this study. This is similar to a study done by Shiji K Jacob in Kochi which revealed that the prevalence of obesity is now increasing and the causes are dense food and reduced exercise.[18]

BMI of mothers & duration of sleep were significantly associated in this study. According to a study done by Shiny George in Kerala, among the influencing factors sleeping time and fast food were found to be significant.[7]

This study showed use of nonsmoking tobacco products among tribal mothers and students. A study done by Palash Jyoti Misra among tribal people in Assam also reported high use of tobacco products. Tobacco use, alcohol use and unhealthy diet habits were high in that population and were major NCD risk factors.[19] In this study, a significant association between BMI of mothers and use of nonsmoking tobacco products has been seen.

According to this study, the association between BP of mother and BP of student was not found to be statistically significant. In this study, BP among students was measured only in a narrow age group, 12-15 years, due to feasibility purposes. Among students, 16% in urban area, 9.3%in tribal area and 5.3% in rural area had above normal values for BP measurement. In a study done in Kolkata by Partha Chakraborthy, 1.53% of hypertension was reported in urban schools and 70.37% were from adolescent age group.[20]

The association of BP and use of non-smoking tobacco was found to be statistically significant in this study. A study done by Palash Jyoti Misra among tribal people in Assam also supported this.[19]

Conclusion

Study on lifestyle risk factors in school children and its relationship to their mothers' was a study done to understand the association of BMI & BP between school children in the age group 12-15 years & their mothers in different socioeconomic backgrounds and to study the factors associated with BMI & BP.

There was a statistically significant association between BMI of mother and student This points to the importance of maintaining a normal BMI as it is found to affect the next generation also. The association between BMI & BP of both mother and student was statistically significant.. An increased BMI is associated with abnormal BP values, which is a precursor for life style diseases. Hence maintaining a normal BMI in children is essential to protect the future generation from lifestyle diseases. Physical inactivity and no desire to change weight are associated with increased BMI. Vigorous physical activity should be promoted among students as it helps to have a normal BMI. Students should be educated about the harmful effects of overweight so that a desire to change weight can be made which will prevent overweight. This should be done through campaigns against obesity in the schools. Follow up of overweight and obese students should be done to monitor their progress.

None of the tribal students had measured their BP before, while only 1.3% of mothers had their BP measured before. The importance of checking BP should be stressed in the tribal population and measures should be taken for tracking of BP .

The limitation of the study is that the BMI of students may be influenced by paternal characteristics also which was not measured in this study due to feasibility purposes.

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