

Original Articles

Body mass index, allergic rhinitis and asthma in children

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(Key words: Body mass index, asthma, allergic rhinitis, children)

Abstract

Objective To assess the possible relationship of body-weight and body mass index (BMI) to childhood asthma and allergic rhinitis.

Setting Chilaw divisional secretariat area.

Design Prospective observational study.

Method Children aged 13-14 years in 20 out of 22 schools were assessed from April to June 2003 using the internationally validated ISAAC questionnaire on asthma and allergies. The children and parents filled the questionnaire. Height and weight of children were measured using a standardized procedure. Reference ranges for the normal BMI data were obtained from reference growth charts of Ministry of Health. Data was analysed using Epi info version 6.0.

Results Total number of children recruited was 866. 185 (21%) gave a positive response to ever having had wheezing. Allergic rhinitis was found in 233 [27%]. Only 97 [11%] had both asthma and allergic rhinitis. The BMI was <5th centile in 407 (47%), 5th - 85th centile in 418 (48.3%) and >85th centile in 41 (4.7%).

Conclusion No significant association was found between BMI and asthma/allergic rhinitis in 13-14 year old school children in the Chilaw area.

Introduction

A number of studies have attempted to look at the relationship of bodyweight and body mass index [BMI] to childhood asthma and allergies^{1,2,3,4,5}. A positive association between asthma and obesity has

been reported in adults^{6,7,8}. This tendency is more evident in women and in adolescent girls^{5,9} than adolescent boys. A similar association between asthma symptoms and obesity has been reported in children^{2,11,12,13,14}. The present study was undertaken to explore the relationship, if any, of weight and BMI to asthma and allergic rhinitis in a cohort of early teenage years in a semi-urban area of a developing country.

Objective

To assess the possible relationship of bodyweight and BMI to childhood asthma and allergic rhinitis.

Setting

Chilaw divisional secretariat area, which is 50 miles north of Colombo in the coastal belt of Sri Lanka.

Design

Prospective observational study.

Method

Children, aged 13-14 years [grade 8], in 20 out of 22 schools in Chilaw divisional secretariat region, were assessed. Two schools were left out due to our inability to reach the schools by a vehicle due to extremely poor road conditions caused by recent rains. Subjects were assessed using the internationally validated ISAAC questionnaire on asthma and allergies¹⁵. The children and parents filled the questionnaire. Asthma, as a dependant variable, was defined as a positive answer to question "Have you ever had wheezing or whistling in chest?" Analysis was repeated using response to the question on wheezing or whistling in the last 12 months as the dependant variable. Allergic rhinitis was defined as a positive answer to question "Did you ever have sneezing or runny nose or a nasal block without having a cold or fever?" This was repeated by using the question whether they had these symptoms during last 12 months. Height and weight of children were

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measured using a standardized procedure by same investigator. Reference ranges for normal BMI data was obtained from reference growth charts of the Ministry of Health, Sri Lanka. Reference ranges were taken as:

- Group 1 <5th percentile for age
- Group 2 5th – 85th percentile for age
- Group 3 >85th percentile for age

Data was analysed using Epi info version 6.0.

Results

Total number of children recruited was 866 of whom 448 (51.8%) were males and 417(48.2%) were females. Distribution according to BMI is shown below.

BMI	Number
Group 1	407(47.0%)
Group 2	418 (48.3%)
Group 3	41 (04.7%)

4.7% were overweight while 47% were underweight for age in Chilaw area.

Sex distribution of the 3 BMI groups is as follows:

BMI	Male	Female
Group 1	252 (62%)	155 (38%)
Group 2	184 (44%)	234 (56%)
Group 3	13 (32%)	28 (68%)

It was observed that more boys were underweight while more girls were overweight (P<0.001).

185 [21%] children gave a positive response to ever having had wheezing. They belong to the following BMI groups:

BMI	Wheezing	
	Yes	No
Group 1	87 (21%)	320 (79%)
Group 2	88 (21%)	330 (79%)
Group 3	10 (24%)	31 (76%)

Cross analysis

Groups 1&2	p=0.90	(P>0.05)
Groups 1&3	p=0.655	(P>0.05)
Groups 2&3	p=0.618	(P>0.05)

149 [17%] children said they had wheezing in the previous 12 months. This is shown below

Wheezing in last 12 months

BMI	Yes	No
Group 1	69 (17%)	338 (83%)
Group 2	73 (17%)	345 (83%)
Group 3	7 (17%)	34 (83%)

Cross analysis

Groups 1&2	p=0.845	(P>0.05)
Groups 1&3	p=0.984	(P>0.05)
Groups 2&3	p=0.949	(P>0.05)

Sex distribution of the wheezers is shown below.

Sex	Wheezing	
	Yes	No
Male	118 (26%)	331 (74%)
Female	67 (16%)	350 (84%)

(P<0.001)

98 [22%] males and 51 [12%] females said they had wheezing in last 12months. This is shown below.

Sex	Wheezing in last 12 months	
	Yes	No
Male	98 (22%)	351 (78%)
Female	51 (12%)	366 (87%)

(P<0.001)

According to above data wheezing is significantly higher in boys in 13-14 year age group in Chilaw area.

In the study sample allergic rhinitis was found in 233 [27%] children. The sex distribution is shown below.

Sex	Allergic rhinitis	
	Yes	No
Male	137 (31%)	312 (69%)
Female	96 (23%)	321 (77%)

(P<0.05)

187 (22%) said they had allergic rhinitis in last 12 months. The sex distribution is shown below.

<i>Sex</i>	<i>Allergic rhinitis in last 12 months</i>	
	<i>Yes</i>	<i>No</i>
Male	106 (24%)	343 (76%)
Female	81 (19%)	336 (81%)

(P>0.05)

Distribution of allergic rhinitis in the 3 BMI groups is shown below.

<i>BMI</i>	<i>Allergic rhinitis</i>	
	<i>Yes</i>	<i>No</i>
Group 1	101 (25%)	306 (75%)
Group 2	122 (29%)	296 (71%)
Group 3	10 (24%)	31 (76%)

Cross Analysis

Groups 1&2	P=0.157	(P>0.05)
Groups 1&3	P=0.952	(P>0.05)
Groups 2&3	P=0.517	(P>0.05)

Distribution of children who had allergic rhinitis in the last 12 months in the 3 BMI groups is as follows:

<i>BMI</i>	<i>Allergic rhinitis in last 12 months</i>	
	<i>Yes</i>	<i>No</i>
Group 1	88 (22%)	327 (80%)
Group 2	99 (24%)	319 (76%)
Group 3	8 (20%)	33 (80%)

Cross Analysis

Groups 1&2	P=0.391	(P>0.05)
Groups 1&3	P=0.799	(P>0.05)
Groups 2&3	P=0.546	(P>0.05)

Only 97 (11%) children had both asthma and allergic rhinitis as shown below:

<i>BMI</i>	<i>Asthma</i>	<i>Allergic rhinitis</i>	<i>Both</i>
Group 1	87(21%)	101(25%)	40 (10%)
Group 2	88(21%)	122 (29%)	51 (12%)
Group 3	10(24%)	10 (24%)	06 (15%)
Total	185(21%)	233(27%)	97(11%)

Discussion

In Chilaw divisional secretariat region 47% of 13-14 year age group children were found to be underweight for their age. 61% of them were boys. Only 4.7% were above 85th percentile for age and 68% of them were girls. It was a significant finding that more boys had wheezing than girls in our sample. There was no difference in sexes among the children with allergic rhinitis.

The National Health and Nutrition examination study III done in USA showed a significantly positive association between BMI and asthma but no evident relation between BMI and atopy. No effect modification by sex was seen.

A study done in UK among 4-11 year olds² also showed an association between obesity and asthma and in the multi ethnic inner city sample the association was stronger in girls than boys.

We did not find any relationship between high BMI and asthma or allergic rhinitis in 13-14 year age group children selected from this area in Sri Lanka P values being well over 0.05.

Conclusions

- No significant association between BMI and asthma and allergic rhinitis was found in 13-14 year old school children in the Chilaw area.
- More boys were underweight for their age in 13-14 year age group in the Chilaw area.
- Asthma was more common in boys than girls in 13-14 year age group in Chilaw area.

Further studies are required to determine the nutritional status of all school children in the Chilaw region. Further studies to assess the relationship of BMI and asthma and allergies in different regions in Sri Lanka are also required.

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References

1. Mutius E V, Schwartz J, Neas L M, Dockery D, Weiss S T. Relation of body mass index to asthma and atopy in children: National health and nutrition examination study III. *Thorax* 2001; **56**: 835-8.
2. Luder E, Melnik T A, DiMaio M. Association of being overweight with greater asthma symptoms in inner city black and Hispanic children. *Journal of Pediatrics* 1998; **132** (4): 699-703.
3. Gennuso J, Epstein L H, Paluch R A, Cerny F. The relationship between asthma and obesity in urban minority children and adolescents. *Archives of Paediatrics and Adolescent Medicine* 1998; **152** (12): 1197-200.
4. Figueroa-Munoz J I, Chinn S, Rona R J. Association between obesity and asthma in 4-11 year old children in the UK. *Thorax* 2001; **56**: 133-7.
5. Sterne J A C, Montgomery S C, Azima H. Birth weight, body mass index and asthma in young adults. *Thorax* 1999; **54**: 396-402.
6. Seidell J C, de Groot L C, Van Sonsbeek J L. Association of moderate and severe overweight with self reported illness and medical care in Dutch adults. *American Journal of Public Health* 1986; **76**: 264-9.
7. Negri E, Pagano R, Decarli A. Body weight and the prevalence of chronic diseases. *Journal Epidemiology Community Health* 1988; **42**: 24-9.
8. Camargo L A, Weiss S T, Zhang S. Prospective study of BMI, weight change and risk of adult onset asthma in women. *Archives of Internal Medicine* 1999; **159**: 2582-8.
9. Chen Y, Dales R, Krewski D. Increased effects of smoking and obesity on asthma among female Canadians: the national population health survey 1994-1995. *American Journal Epidemiology* 1999; **150**: 255-62.
10. Huang S L, Shaio G M, Chou P. Association between BMI and allergy in teenage girls in Taiwan. *Clin Exp Allergy* 1999; **29**: 323-9.
11. Somerville S M, Rona R J, Chinn S. Obesity and respiratory symptoms in primary school. *Arch Dis Child* 1984; **59**: 940-4.
12. Schwartz J, Gold D, Dockery D W. Predictors of asthma and persistent wheeze in a national sample of children in the United States. *Am Rev Resp Dis* 1990; **148**: 555-62.
13. Kaplan T A, Montana E. Exercise induced bronchospasm in non-asthmatic obese children. *Clin Paed [Philadelphia]* 1993; **32**: 220-5.
14. Gennuso J, Epstein L H, Paluch R A. The relationship between asthma and obesity in urban minority children and adolescents. *Arch Paed Adolescent Med* 1998; **52**: 1197-200.
15. The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhino conjunctivitis, and atopic eczema: ISAAC. *The Lancet* 1998; **351**: 1225-32.

