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Malnutrition and obesity on a Paediatric Ward of a tertiary teaching hospital in Kerala, India.

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Brief Report

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Abstract

We report the nutritional profile of children 5 years of age or younger admitted to a ward of a tertiary teaching hospital in Kerala, India. We surveyed 40 children admitted to a ward of the Sri Avittam Thirunal Hospital (SAT), Trivandrum, during one calendar month in 2008. The measures included an assessment of Protein Energy Malnutrition (PEM), Stunting, Wasting and Obesity. We also explored the socioeconomic, gender and age factors impacting on these measures. Prevalence of Protein Energy Malnutrition (PEM) was 27.5 % as classified by the Indian Academy of Pediatricians (IAP), 48 % of subjects were found to be stunted. 50 % had wasting and 13 % were overweight. Boys were more likely to develop PEM (O.R=2.9), stunting (O.R=1.9) and wasting (O.R=2.2). Girls were more likely to be overweight/obese (O.R= 2.00). Those classified 'Below Poverty Line' (BPL) were less likely to develop PEM (O.R= 0.3), stunting (O.R=0.4) or wasting (O.R=0.8).Those 'Above Poverty Line' (APL) were more likely to be overweight (O.R=1.60). This study indicates the prevalence of both malnutrition and obesity in an Indian hospital population.

Introduction

India has experienced an economic surge over the past decade. This has been associated with a shift in of the prevalence of diseases from those of purely infectious etiology to now also encompass non-communicable diseases. Kerala forms an ideal setting to study these changes as it is one of the first states in India to experience an economic boom. Children's health is an important indicator of prosperity and as a marker of what we have dubbed the 'epidemiological transition'. Analysis of the nutritional profile of the patients treated in hospital is also an important measure of need in those most at risk. Such information has value in planning public health and resource allocation. The aim of this study was to assess the nutritional profile of children below 5 years of age admitted to the wards of a tertiary teaching hospital in Kerala.

Method

A survey of 40 children admitted to a general paediatric ward in the Sri Avittam Thirunal Hospital (SAT), Trivandrum, from March 1 to March 31, 2008. Children with Cerebral palsy, chronic liver disease, Cushing's disease, and those who were seriously ill were excluded from the survey. Acute diarrhoea/gastroenteritis cases were similarly excluded as they are admitted to another ward. All parents gave informed consent. The demographic and socioeconomic status was noted. The child was classified as 'Above or Below the Poverty Line' as per their eligibility for the 'ration card'. The 'BPL' card entitles the holder to food and other subsidies. The anthropometric measurements included height, weight, head circumference, chest circumference, and mid arm circumference. The measurements were taken on the evening of the day of admission using the same equipment. All children were weighed only in their underwear. Height was taken in the standing position for all children above two years of age and in the supine position for those below two years of age; the data were analysed in the 'World Health Organisation's (WHO) 'Anthro' software . Weight was similarly taken in supine posture for children below one year of age and in standing position for older children .To minimize errors all children were measured with the same equipment. Children were classified as having Protein Energy Malnutrition (PEM), based on weight for age (WFA) as per IAP classification. They were classified into groups for 'Height for Age' (HFA) as per Waterlow's classification for stunting. They were also classified as per Waterlow's classification for wasting and obesity based on 'Weight for Height' (WFH). Data was analyzed using the SPSS version10. Software and the

WHO Anthro 2005 software (1) to compare against WHO child growth standards. Statistical analysis was performed using SPSS version 10 and WHO Anthro 2005 Software.

Results

The study group comprised 45 % girls and 55 % boys. 73 % were BPL (Below Poverty Line) whilst 27 % were APL (Above Poverty Line). Those in the 0-2 years of age comprised 65 % of the sample equally divided between the 0-1 year and 1-2 year old groups. The mean values of each parameter were: WFA 89% (e.g. the ideal weight of a 1 year old child as per IAP is 10 kg. If three children had weights 6, 8, and 10 kgs their WFA would be 60, 80, and 100% respectively. The average value is the mean of these values or 80%). HFA 95%, and WFH 94%. This data is consistent with values reported for Indian children generally. The prevalence of Protein Energy Malnutrition (PEM) was 28 % as per IAP classification. Forty eight percent of our subjects were stunted as per Waterlow's grading for HFA. Fifty percent had wasting and 13 % were overweight.

Comparing z values as per WHO scales, 28 % had WFA less than the lower limit of normal, 17 % had HFA below the lower limits of normal, 20 % had a WFH below the lower limits of normal. 17 % had BMI below mean as defined by WHO. 10 % had a head circumference (HC) below the mean, and 46 % of the group had a mid arm circumference (MAC) below the mean. In contrast 7 % had HFA above upper limit of normal as set by WHO but 2 % had Body Mass Index (BMI) for age greater than normal.

Gender distribution

Boys were more likely to display PEM (O.R=2.9), stunting (O.R=1.9) and wasting (O.R=2.2). Females in contrast were more likely to be overweight/obese (O.R= 2.00).
23 % of boys had z values for WFH below -2.6, in comparison to 7 % of girls. 36 % boys and 15 % girls in our study group had WFA below normal as defined by the WHO. 3% of girls had z values for WFA greater than 3.4. The HFA for males and females was similar with 18 % of both males and girls falling below the lower limits of normal but 10 % of girls had a HFA greater than normal as defined by the WHO. 20 % of boys have z value <-3 as compared to 5 % girls. 15 % boys and 10 % girls have HC for age lower than average as defined by the WHO. 5 % of girls have HC for age exceeding z = +3.
46 % girls and 41 % of boys had MAC for age less than lower limits of normal as defined by the WHO

Socioeconomic distribution

Those characterized as BPL were less likely to have PEM. (O.R= 0.3), stunting (O.R=0.4) or wasting (O.R=0.8).Those who were defined as APL were more likely to be overweight (O.R=1.60).Infants were less likely to have PEM (O.R= 0.4) and asting (O.R= 0.3) compared to others but were equally likely to have stunting (O.R= 0.9). Infants were more likely to be overweight (O.R=1.45). A summary of the results is presented in Table 1.

Discussion

Those above the poverty line were more likely to be obese, but also more likely to suffer from PEM, stunting and wasting. However it is possible that the criteria for classification based on entitlement to State benefits may not be a valid measure of need. The fact that 48 % of the sample was stunted may be indicative of chronic under-nutrition in our sample. On the other hand a prevalence of 13 % overweight / obesity in children attending hospital of which 73 % are below the poverty line is an indicator of the rising prevalence of obesity in states like Kerala. Those who are currently undernourished may face the burden of obesity as their eating habits change with greater prosperity unless we formulate a strategy to tackle the clear trend to obesity. Overweight children should be monitored closely. The better nutrition of infants, in spite of most of being BPL may be attributed to breast feeding. It is the diet of older weaned children that contributes to the picture described here. Nutritional data of mothers was not ascertained and we acknowledge this as a limitation of this study. Cultural issues may also impact on the observations reported here. While malnutrition among female children in north India may be the result of the preferential nourishment of male children, the female preponderance to obesity reported here needs further examination. Kerala has a high rate of literacy and relative equality of treatment of children of either gender as suggested by the lowest rate of sex selective abortions in India, in Patel's work (2).

Varghese and Vijayakumar (3) reported a significant rise of obesity in adults in rural Kerala**.** They proposed that nutritional counseling of adults should be a public health priority in order to prevent an obesity epidemic in Kerala. It is against this backdrop that we present the nutritional profile of children in Kerala. National studies, by Soman (4) have similarly shown that Kerala has the highest proportion of nourished children under *5* years of age and therefore a greater a risk for obesity and lifestyle diseases. In an acute illness WFH is the first index to fall, followed by WFA. HFA is the last parameter to decline. Thus HFA is a proxy measure for chronic undernourishment. The high percentage of children falling below the mean distribution as per WHO clearly indicates that we have a long way to go in eradicating under nutrition. This calls for greater effort to supplement the food of the poorest strata of society. The existence of cases which exceed the mean, as per WHO specifications, is the second cause for concern. If the obesity epidemic is not tackled early it will increase demands on the health care sector already struggling to cope with epidemics of infectious diseases

Anthropometry	Variables	p value	O.R	95 % C.I
P.E.M (Yes/No)	Gender (Boy /Girl)	0.15	2.9	0.62 - 12.98
	Socioeconomic (BPL /APL)	0.12	0.31	0.07 - 1.39
	Age (Infant/1-4 Years)	0.21	0.36	0.07 - 2.00
STUNTING (Yes/No)	Gender (Boy /Girl)	0.25	1.9	0.53 – 6.69
	Socioeconomic (BPL /APL)	0.18	0.40	0.09 – 1.6
	Age (Infant/1-4 Years)	0.58	0.92	0.25 – 3.48
WASTING (Yes/No)	Gender (Boy /Girl)	0.17	2.27	0.64 – 8.10
	Socioeconomic (BPL /APL)	0.50	0.78	0.19 – 3.13
	Age (Infant/1-4 Years)	0.09	0.31	0.08 – 1.25
OBESITY (Yes/No)	Gender (Boy /Girl)	0.40	0.50	0.07 – 3.30
	Socioeconomic (APL /BPL)	0.58	1.60	0.16 - 16.13
	Age (Infant/1-4 Years)	0.53	1.46	0.21 – 9.98

Table 1
Results of Anthropometric Analysis

Reference

(1) World Health Organisation. http://www.who.int/childgrowth/software/en/

(2) Patel R. The Practice of Sex Selective Abortion in India: May You be the Mother of a Hundred Sons. [Thesis]: The University of North Carolina. Available from: http://gi.unc.edu/research/pdf/abortion.pdf. Accessed July 2009.

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