ORIGINAL ARTICLE

Assessment and comparison of nutritional status of government and private secondary school children of Muzaffarnagar

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Citation

Article Cycle

Abstract

Background: Malnutrition leads to poor cognitive performance and physical growth in children and is a major component of school health services. Imbalanced nutrition in adolescence can put them at high risk of chronic diseases particularly if combined with adverse lifestyle. **Aims & Objectives**: This study was designed to assess and compare the nutritional status of government and private school children of Muzaffarnagar city. **Material and Methods:** School based, comparative Cross-sectional study. One private and one government school was selected using unistage stratified random sampling. A total of 1960 (980 each from private school and government school) school children of class 6-12 were studied for socio-epidemiological details, dietary habits, and physical activity. Information on education status, occupation, monthly income of their parents was also collected. Required anthropometric measurements were taken. **Results**: Of 980 children from private school, 90 (9.18%) were underweight,138 (14.08%) were overweight, and 137 (13.97%) were obese. Majority of children from government school were underweight 215 (21.94%) except for 24 (2.45%) overweight children. **Conclusion**: This study shows the dual nature of nutritional problem, under-nutrition among the lower socioeconomic class of govt. school at one side and worrisome epidemic of obesity among the affluent of private school

Keywords

Introduction

The wealth of a nation depends on its healthy citizens. Early childhood constitutes the foundation of adult productivity and nutrition is a major determinant of the quality or strength of this foundation. Optimal physical and mental development of the child is the key to accelerate overall development of any country.

Malnutrition includes both extremes, under-nutrition on one end and over-nutrition on the other. Malnutrition in childhood leads to variety of diseases in later life. The main aim of the nutritional assessment of a community is to know the magnitude and geographical distribution of malnutrition as a major public health problem and to analyze the ecological factors that are directly or indirectly responsible and to suggest appropriate

corrective measures. Keeping this in mind, assessment and comparison of the nutritional status of children of both government and private primary schools of Muzaffarnagar city was carried out

Aims & Objectives

1. To assess the nutritional status of government and private school children.
2. To compare the nutritional status of private and government school children.
3. To correlate the nutritional status of children with selected socio demographic variable and risk factors.

Material & Methods

Study design: A school based comparative cross-sectional study. Study setting: Private and government schools of Muzaffarnagar city. Sampling method: Unistage stratified random sampling method was used to select the schools. The list of schools with their strength of students was obtained from DEO of Muzaffarnagar. Schools were divided into two strata, government schools, and private schools. Out of each stratum, one private school, and one government school were selected. Systemic random sampling was used for selection of students from government school. Study unit: Students from class 6th to 12th from the randomly selected schools were included in the study. Inclusion and exclusion criteria: Students with chronic illness and endocrine problems were excluded from the study. Students, whose parents did not provide consent and those who were absent or sick during the period of study were excluded. Sample size: The total number of students of private school from class 6th to 12th fulfilling the inclusion criteria was 980. Total strength of the students in government school from class 6th to 12th was about 5000, we took every fifth student till we complete the sample comparable to private school i.e. 980 making a total sample size of 1960. Approval: A prior written approval to conduct the study was taken from Ethical Committee of the institution and school administration. Parents of each participant were informed about the study protocol and written consent was obtained for their child's participation beforehand. Study tools: A semi-structured questionnaire was used to elicit the desired information regarding socio-epidemiological variables of child such as age, sex, religion, type of diet, frequency of consumption of junk food, physical aerobic exercise and outdoor games, duration of watching TV and time spent in front of the computer.

To check the feasibility of the questionnaire, a pilot study was carried out on 200 school children. Students were explained about study and questionnaire was distributed in the classroom. Children were guided and instructed to take the questionnaire home and get it filled by their parents/guardians for parent's educational status, occupation, monthly income, which were collected back the next day. One to one interview with children was conducted to verify the information and height and weight of the children was measured using standardized techniques by using stadiometer and portable dial weighing machine. BMI was calculated using the formula: $BMI = Weight(kg)/Height(meter^2)$. According to Center for Disease Control and Prevention, BMI for age percentile chart, which is considered to provide an appropriate reference curves for the world population aged 2-20 years. Children were categorized into four groups according to CDC growth chart: ≥95th percentile as obese, >85th percentile as overweight, 5-85th percentile as normal and <5th percentile as underweight.1 socio-economic status of study subjects was decided according to modified B.G. Prasad classification. All India consumer price index for the month of the September 2016 i.e. 126 was taken to update the income. Study duration: 6 months (1st May 2016 – 30th October 2016). Statistical analysis: Data was compiled using Excel software and analyzed using Epi-Info software. Proportion and Chi-square tests with yate correction have been used in this study. For statistical tests applied, $p < 0.05$ was considered as the significant level.

Results

Table-1 Among 980 children of private school, maximum percentage (51.53%) was of 8-12 yrs. old, while in government aged 12-16 years were maximum (45%), Sex wise, 43.87% were girls and 56.12% were boys in private school and 34.89% were girls and 65.10% were boys in government school. In both the schools percentage of Hindu children was more. Private school children belonged to only Classes I and II socioeconomic group (none from class iii, iv, and v) while in government school children from class iv and v were also present. All the parents of private school children were literate whereas 15.30% mothers and 13.16% fathers of government school were illiterate.

Table-2 Figure 1 Figure 2 The prevalence of underweight, overweight and obesity among private school children was 90(9.18%), 138(14.08%), and 137(13.97%), respectively. Underweight prevalence was more in government school (21.94%) when compared with private school (9.18%). The overweight prevalence was more in private school (14.08%) than government school (2.45%) This association was statistically significant

Table-3 Prevalence of obese student was more in male (15.64%) in private school, whereas underweight prevalence was more in females (16.28%) of private school and 33.33% of government school. Association of obesity and sex of the children was significant in private school, while it was insignificant in government school.

Table-4 Prevalence of obesity was 19.66% in the private school students who were taking junk food >twice/week as against 8.68 % in those who were taking junk food just once/week and association was statistically significant. Same statistically significant association with junk food and obesity was seen in government school students.

Table 5 Prevalence of obesity was 18.24% in the private school students who were playing out door games for <1hour as against 8.31 % those who were playing for >1 hour and relation was statistically significant. Same statistically significant relation without door games was seen in government school students.

Discussion

The key findings of this study included the following, firstly, there was high proportion of underweight, stunting and thinness among pupils attending government school. On the contrary, there was high proportion of overweight among children attending private schools. Prevalence of overweight and obesity seen in this study was same to the findings in study done by Chhatwal et al., (2) in Punjab (14%).Prevalence of overweight and obesity was higher in our study as compared to the findings in studies by Saraswathi et al., (3) Mysore (8.75%) and by Kumari and Krishna, (4) in Guntur (8.4%). Sharma et al., (5) in Delhi have reported higher prevalence of obesity of 22%. The prevalence of under nutrition in government schools of Bangalore as reported by Hasan et al., (6) was 58.2%, which was more than our study. A recent study conducted by Patnaik et al. in Bhubaneswar, (7) the prevalence of overweight was 27.8% in both Government Schools and Private Schools taken together (private schools- 45.2% and Govt. schools- 10.5%). Compared to it our figure of

overweight is very low. Study conducted by Rashmi et al. in govt. school Bangalore (8) showed under nutrition in 61% which is greater than our figure.

The children of private schools who belonged to high socioeconomic class were better nourished compared to Government school students who belonged to low socioeconomic class. Studies by Ramesh, (9) in Kerala and Thekdi (10) in Gujarat also stated the same. A study conducted by Rebecca (11) on Aurangabad school children also mentioned combined prevalence of overweight and obesity in boys and girls as 15.7% and 14.2% respectively. Similar findings were observed by Jigna Shah and Jhanvi et al. (12,13).

Snacks and junk foods consumed at home and outside home is one of the main risk factor for overweight and obesity. This positive association of high calorie/fat rich foods with body weight has been proved by various research studies. (14),(15),(10),(11)

Lack of outdoor game activity and inadequate aerobic exercise were significantly associated with obese private school children. Similar finding was reported by Kotian et al., (16) in Mangalore, which showed higher risk among those participating <2 hour/day in any type of physical activity, whereas higher level of physical activity with poor nutrition led most of the government school children toward undernourishment.

Study by Dietz et al., (17) have found a positive association between the time spent on watching television/playing computers (≥3 hour/day) and increased prevalence of overweight in children, similar to this study.

Under nutrition prevalence was not related to junk food in our study, but Bangalore study showed that bakeries items also predispose to malnutrition as maximum of them provide only energy and are deficient in both macro- and micro-nutrients. (18)

one important observation of the study is that age of the government school children is much higher as compared to the private school children, which could be explained by delayed admission to the school due to non-availability or accessibility of schools, as most of the students from the government school were from the neighboring villages.

Conclusion

On the whole, the study revealed that under nutrition is much common among children in government schools but over nutrition appeared to be more common in private schools, largely driven by improved socio-economic status and urbanization. Our findings also reinforce the most important causes of malnutrition including inadequate food consumption due to poverty

Recommendation

This study highlights that overweight and obesity are the problems prevalent in affluent communities where sedentary lifestyle is followed. Physical inactivity and high calorie diet increases the risk of being overweight. This arises the need to devise meaningful measures to develop a healthy lifestyle among school children by creating awareness about balanced diet and recommended level of physical activity Since malnutrition is the outcome of several factors, the problem can be solved by taking actions simultaneously at various levels - family, school, community, national and international levels through health education. Moreover, efforts should be made to educate parents of obese children, teachers and students to follow healthy life style like to do daily exercises, avoid sedentary life style like prolong television watching, playing computer games and to avoid eating junk food. Since the prevalence of underweight in case of government school children is very high, they should be advised to take balanced diet which should meet the daily caloric and protein requirement and should be affordable also.

Authors Contribution

All the authors have made valuable and substantial contribution to the study at every step of the study

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Tables

TABLE 1 DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO BIO-SOCIAL CHARACTERS

Bio-social character	Private school (N=980)		Government school (N=980)	
	Number	Percentage	Number	Percentage
Age (Years)				
8-12	505	51.53%	222	22.65%
12-16	370	37.75%	441	45.00%
16 and above	105	10.72%	317	32.35%
Total	980	100%	980	100%
Sex				
Male	550	56.13%	638	65.11%
Female	430	43.87%	342	34.89%
Total	980	100%	980	100%
Religion				
Hindu	830	84.69%	682	69.59%
Muslims	115	11.73%	292	29.79%
Sikh	20	2.04%	4	0.41%
Other	15	1.53%	2	0.20%
Total	980	100%	980	100%
Socio-economic status				
I	754	76.94%	400	40.84%
II	226	23.06%	225	22.95%
III	0	0%	200	20.40%
IV	0	0%	130	13.26%
V	0	0%	25	2.55%
Total	980	100%	980	100%
Education status of mother				
Illiterate	0	0%	150	15.30%
Literate	980	100%	730	84.70%
Total	980	100%	980	100%
Education status of father				
Illiterate	0	0%	129	13.16%
Literate	980	100%	851	86.84%
Total	980	100%	980	100%
Occupation of mothers				
House wife	805	82.14%	931	95.0%
Professional	175	17.86%	49	5.00%
Total	980	100%	980	100%
Occupation of fathers				
Job/service	430	43.87%	922	94.08%
Business	550	56.13%	58	5.92%
Total	980	100%	980	100%
Type of diet				
Vegetarian	746	76.13%	540	55.11%
Non-vegetarian/Mixed	234	23.87%	440	44.89%
Total	980	100%	980	100%
Junk food				
Once/week	507	51.74%	704	71.84%
>Twice/week	473	48.26%	276	28.16%
Total	980	100%	980	100%
Physical activity				
i.Aerobics				

Yes	407	41.54	180	18.36%
No	573	58.46%	820	83.67%
Total	980	100%	980	100%
ii. Out-door games				
>1 hour	421	42.96%	323	32.96%
<1 hour	559	57.04%	657	67.04%
Total	980	100%	980	100%
Watching TV				
<1hour	313	68.03%	529	53.97%
>1hour	667	31.97%	451	46.03%
Total	980	100%	980	100%

TABLE 2 DISTRIBUTION OF STUDY SUBJECTS ACCORDING TO NUTRITIONAL STATUS

Nutritional status	Private school		Government school		Statistical test
	Number	Percentage	Number	Percentage	
Under-weight	90	9.18%	215	21.94%	X2=60.671 DF=1 P<0.0001
Normal	615	62.75%	721	75.37%	X2=26.417 DF=1 P<0.0001
Over weight	138	14.08%	24	2.45%	X2=87.450 DF=1 P<0.0001
Obese	137	13.99%	20	2.04%	X2=94.783 DF=1 P<0.0001
Total	980	100.0%	980	100.0%	

TABLE 3 NUTRITIONAL STATUS OF STUDY SUBJECTS IN RELATION TO BIO-SOCIAL CHARACTERS

Variable	Private school					Government school				
Sex	UW	Normal	OW	Obese	Total	UW	Normal	OW	Obese	Total
Male	20	367	77	86	550	101	506	16	15	638
	3.64%	66.73%%	14.00%%	15.64%%	100%	15.83%	79.31%%	2.51%%	2.35%%	100%
Female	70	248	61	51	430	114	21	8	5	342
	16.28%%	57.67%	14.19%	11.86%	100%	33.33%	6.14%	2.34%	1.46%	100%
Total	90	615	138	137	980	215	721	24	20	980
X2	$\chi2 = 47.621$, df = 3, p = 0.0001					$\chi2 = 244.257$, df = 3, p = 0.0001				

TABLE 4 NUTRITIONAL STATUS OF STUDY SUBJECTS IN RELATION TO DIET

Variable	Private school					Government school				
Junk food	UW	Normal	OW	Obese	Total	OW	Normal	Ow	Obese	Total
Once/week	44	355	64	44	507	104	596	2	2	704
	8.68%	70.01%	12.62%	8.68%	100%	14.77%	84.65%	0.28%	0.28%	100%
>Twice/week	46	260	74	93	473	111	125	22	18	276
	9.73%	54.96%	15.64%	19.66%	100%	40.21%	45.28%	7.97%	6.52%	100%
Total	90	615	138	137	980	215	721	24	20	980
$\chi2 = 31.828$, df = 3, p =0.0001						$\chi2 = 185.919$, df = 3, p =0.0001				

TABLE 5 NUTRITIONAL STATUS OF STUDY SUBJECTS IN RELATION TO PHYSICAL ACTIVITY

Variable	Private school					Government school				
O.D.G.	Uw	Normal	OW	Obese	Total	UW	Normal	OW	Obese	Total
> 1 hour	88	259	39	35	421	135	573	9	4	721
	20.91%	61.52%	9.26%	8.31%	100%	18.72%	79.47%	1.24%	0.55%	100%
<1 hour	2	356	99	102	559	80	148	15	16	259
	0.37%	63.68%	17.71%	18.24%	100%	30.89%	57.14%	5.79%	6.18%	100%
Total	90	615	138	137	980	215	721	24	20	980
	$\chi2 = 139.667$, df = 3, p = 0.0001					$\chi2 = 71.346$, df =3, p= 0.0001				

Figures

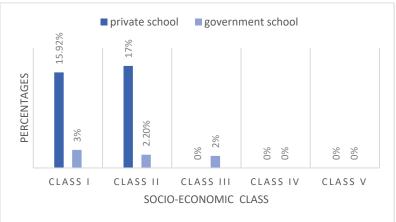### FIGURE 1 COMPARISON OF OBESITY IN GOVERNMENT AND PRIVATE SCHOOL CHILDREN

FIGURE 2 COMPARISON OF PERCENTAGE OF UNDERWEIGHT STUDENTS IN GOVERNMENT AND PRIVATE SCHOOL CHILDREN