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Gender Discrimination in Terms of Nutritional Status of School Children: A Study from Haryana

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Abstract

The one of the millennium development goals is to achieve gender. Gender inequality is one of the major problems faced by the human society. It refers to unequal and biased treatment towards female. The present study was aimed to analyses the gender discrimination in terms of nutritional status of children assessed through anthropometric, nutrient intake and biochemical indicators. Data was collected from two villages of Hisar district i.e. Mangali from Hisar-1 block and Dhiktana from Barwala block of Hisar District, Haryana. Total 218 children (Male (114); Female (114)) were selected randomly. Statistically data was analyzed using SPSS statistical package (version 14.0) for windows. Differences in height, weight, BMI, waist and MUAC circumferences, hemoglobin, hematocrit, ferritin, transferring saturation, serum zinc and CRP concentrations and underweight, stunted, wasted, anemia, iron deficiency and iron deficiency anemia were assessed by using the independent sample t-test for continuous variables and the chi-square test for percentages. A higher proportion of females were found to be underweight, stunted, wasted, anemic, iron deficient and iron deficient anemic as compared to their male counterparts and the differences have been found to be statistically significant ($p< 0.05$). Males were consuming more energy, protein, fat, vitamin A, vitamin C, calcium, iron and zinc in comparison of girls except carbohydrates which was more consumed by the girls (Table 3). However, the differences were found significant only for protein, vitamin A, vitamin C, calcium, iron and zinc ($p < 0.05$).

Keywords Gender Discrimination, Under-Nutrition, Anaemia, Nutrient Intake.

Introduction

The one of the millennium development goals is to achieve gender equality the one of major problems faced by the human society. It refers to unequal and biased treatment towards female. World Economic Forum (WEF) measured gender equality around the world has placed India shockingly at the bottom, at the 113th position out of 130 countries (Anonymous, 2008). It is well documented that gender inequality is wide spread in different states of India (IIPS, 2005). Gender discrimination in Haryana is not confined to lack of education and employment; the females are subjected to discrimination in terms of nutrition and health too.

Adequate nutrition, a fundamental keystone of any individual's health, is especially critical for women. Inadequate nutrition is a disaster not only for women's own health but also for the health of their children. Children of malnourished women are more likely to face cognitive impairments, short stature, lower resistance to infections, and a higher risk of morbidity and mortality. This deprivation in childhood contributes to substantial proportions of women being malnourished and stunted as adults and in this way the vicious cycle of malnutrition is continue (Smith, 2003).

A large number of studies have been conducted to study the gender discrimination in terms of nutrition, health, education, employment and other aspects (Neha et al. 2013; Tiwari, 2013; Arnold et al. 1998; Desai, 1994). Gender inequality in Indian community with respect to child nutritional status, percentage of ever breast feed infants, anaemia among children, child mortality, adult nutritional status, adult food consumption pattern and anaemia among adults have been well documented in National

Family Health Survey-3 (2005). The consumption of milk, fruits and fats and oils was higher among male population as compared to the female counterpart (Neha et al. 2013). Another worrying global fact is that maternal mortality is dropping very slowly at just 0.4 per cent a year, compared to the 5.5 per cent needed to meet the millennium development goal to improve maternal health. Gender inequalities in terms of nutritional status and health lie at the root of the cycle of hunger and malnutrition in India. Up to some extent, woman's own perception of her status is responsible towards gender inequality. Only when women in India begin to feel empowered and equal in status to men, will the stranglehold of gender disparities across the region weaken and break. This paper analyses the gender discrimination in terms of nutritional status of children assessed through anthropometric measurements, dietary survey and biochemical analysis (anaemia and zinc deficiency).

Materials and Methods

Study Area and Sample Size

The present study was conducted in the Department of Foods and Nutrition, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana. Data was collected from two villages of Hisar district i.e. Mangali from Hisar-1 block and Dhiktana from Barwala block of Hisar District, Haryana. In Hisar district out of nine blocks (sub-divisions) two blocks were selected with the proximity of research centre. One village from each block was selected randomly. Total five schools were selected randomly. A list of 350 available children between the age group of 5-8 years was made and out of this 220 children were selected randomly. Written consent of participation from the parents the children was taken before the initiation of study.

Measurements and Data Collection

Anthropometry data i.e. weight, height, mid upper arm circumferences (MUAC) and waist circumferences were collected using standardized procedures and equipment (WHO, 2006). Age was calculated from the date of birth record registered in schools. All measurements were done twice and average mean was calculated. Age, height weight and BMI were used to drive anthropometric indices weight-for-age, height-for-age and weight-for-height and further these indices were used to define underweight, stunting and wasting.

Nutrient Intake

A 24-h recall method was used to measure the mean daily intake of subjects. Calculations of nutrient intake were based on a food composition table of India (Gopalan et al., 2004). The energy content was calculated by using the Atwater factors for proteins, carbohydrates and fats and nutrient retention factors were applied. Additionally, conversion factors were used to calculate retinol equivalents (RE) from total carotene, β-carotene and retinol values. Nutrient intake per day for energy, protein, carbohydrates, fat, vitamin A, vitamin C, iron, zinc and calcium was calculated using VBS Food Calculation System version 4.0 (BaS Nutrition Software, The Netherlands, 2007). Mean nutrient intake of each individual was calculated as the average of the two recall days.

Biochemical Analysis

Blood samples were collected by trained technicians during morning time (08.30am to 10.30am), 7ml venous blood was collected of which 1ml was transferred to EDTA containing tubes for hemoglobin (Hb) analyses and 6ml was transferred to acid washed metal free tubes for serum separation for further analyses. Haemoglobin (g/dl), hematocrit (%), serum ferritin(µg/L), trasferrin saturation (%), serum zinc (µg/L) and C-reactive protein (mg/L) were analysed using standard methods. Anaemia was defined as haemoglobin < 115 g/L in children aged 5–8 y. Iron deficiency was defined as serum ferritin <15 µg/L and Iron deficiency anaemia was defined as either serum ferritin <15 µg/L and haemoglobin <115 g/L.

Statistical Analysis

Statistically data was analyzed using SPSS statistical package (version 14.0) for windows. Differences in height, weight, BMI, waist and MUAC circumferences, hemoglobin, hematocrit, ferritin, transferring saturation, serum zinc and CRP concentrations and underweight, stunted, wasted, anemia, iron deficiency and iron deficiency anemia were assessed by using the independent sample t-test for continuous variables and the chi-square test for percentages. P value less than 0.05 were considered statistically significant.

Results and Discussion

The means and standard deviation of anthropometric measurements have been provided in Table1. Distribution of male and female children was randomized. The average age of children was 6.5 years. Results indicated that boys have significant higher values of weight, mid upper arm circumferences, waist circumferences in comparison of girls. WHOz-score criteria for weight-for-age revealed that 30% participants were underweight; this was more in girls (33%) in comparison of boys (27%). The z-score for height-for-age revealed 32% of the total population stunted and 12% severely stunted. A proportion of girls were stunted (35%) than boys (29%). The z-score for weight-for-height revealed 12% of the total population wasted and only 2% severely wasted. A proportion of girls were wasted (15%) than boys (9%) (Table-2). A higher proportion of females were found to be underweight, stunted and wasted compared to their male counterparts and the differences have been found to be statistically significant ($p < 0.05$). The results of present study are in the line of finding of NFHS-3 presented in figure-1.

Data on nutrient intake indicated that the average intake of energy, protein, carbohydrates, fat, vitamin A, vitamin C, calcium, iron and zinc for all participants was 1150 Kcal, 31.6g, 200g, 25.1g, 211mg, 20.4mg, 414mg, 10.3mg and 5.5mg respectively, per day. Results showed that males were consuming more energy, protein, fat, vitamin A, vitamin C, calcium, iron and zinc in comparison of

girls except carbohydrates which was more consumed by the girls (Table 3). However, the differences were found significant only for protein, vitamin A, vitamin C, calcium, iron and zinc ($p < 0.05$).

The average mean concentrations of hemoglobin, hematocrit, serum ferritin, transferrin saturation, serum zinc and C-reactive protein among all participants were 11.22g/dl, 36.95%, 18.13 µg/L, 16.79%, 854.3 µg/L and 2.13 mg/L, respectively (Table-4). In comparison of females, males had higher concentrations of Hb, hematocrit, serum ferritn and tranferrin saturation and serum zinc and lower concentration of CRP. The values of Hb and serum ferritin were found significant between males and females. The overall prevalence of anemia, iron deficiency and iron deficiency anemia was found to be 58.5% (Hb < 11.5g/dl), 49.3% (Ferritin <12µg/L) and 40.3% (Hb <11.5g/dl; Ferritin <12µg/L) respectively. It became apparent from the data that females had significantly higher prevalence of anemia, iron deficiency and iron deficiency anemia than males. There were no zinc deficiency and infection and inflammation were observed in the study population. The results of present study are consistent with the finding of NFHS-3 presented in figure-2.

Conclusions

Results revealed the gender discrimination in terms of nutritional status of children. That may be because higher preferences is given to boys than girls by the family in terms of quality food and nutrient intake.

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Table: 1 Gender Wise Anthropometric Characteristics of Children

	(N=218)	Boys (114)	Girls (114)
Age (Y)	6.5 ± 0.9	6.3 ± 0.7	6.8 ± 0.9
Height (Cm)	109.3 ± 7.0	108.9 ± 7.0	109.6 ± 7.0
Weight(Kg)	20.5 ± 2.4	22.2 ± 2.2	18.6 ± 2.5
MUAC(Cm)	18.1 ± 0.9	20.2 ± 1.0	16.0 ± 0.8
WAIST(Cm)	52.3 ± 2.7	54.2 ± 2.9	50.3 ± 2.62
WAZ	-1.65 ± 0.7	-1.57 ± 0.8	-1.72 ± 0.7
HAZ	-1.59 ± 1.0	-1.56 ± 1.1	-1.63 ± 1.0
WHZ	-0.92 ± 0.7	-0.91 ± 0.8	-0.94 ± 0.7

Values are mean ± SD, unless otherwise stated.

Table: 2 Gender Wise Prevalence of Underweight, Stunting and Wasting Among Children

	(N=218)	Girls (114)	Boys (114)
Underweight (%)	30.0	33.0	27.0
Severely Underweight (%)	10.0	12.0	8.0
Stunted (%)	32.0	35.0	29.0
Severely Stunted (%)	12.0	13.5	10.5
Wasted (%)	12.0	15.0	9.0
Severely Wasted (%)	2.0	2.0	-

Table: 3 Gender Wise Nutrient Intake of Children

Nutrients	Total (N=218)	Girls (114)	Boys (114)
Energy (Kcal)	1150±248	1112±250	1188±252
Protein (g)	31.6±7.5	28.1±7.6	35.0±8.3
Total carbohydrates (g)	200±45	209±47	190±43
Total fat (g)	25.1± 11	22.8±10	27.4±12
Vitamin A (RE)	211±200	191±161	230±213
Vitamin C (mg)	20.4±19	18.1±19	23.5±19
Calcium (mg)	414±191	396±186	431±196
Iron (mg)	10.3±3.1	7.7±3.0	12.6±3.19
Zinc (mg)	5.5±1.5	4.2±1.3	6.8±1.58

Mean nutrient intake over 2 days.
Values are mean ± SD, unless otherwise stated.

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Table: 4 Gender Wise Biochemical Analysis of Children

	(N=218)	Boys (114)	Girls (114)
Hb (g/dl)	11.22+1.7	12.21+1.9	10.24+1.6
Hematocrit (%)	36.95+4.4	38.92+4.7	34.99+4.1
Serum ferritin(µg/L)	18.13+18.6	19.99+19.1	16.28+18.1
TS (%)	16.79+7.7	18.18+7.7	15.44+7.7
Serum zinc (µg/L)	854.3+113.7	875.3+116.1	832.3+110.4
CRP(mg/L)	2.13+8.53	1.27+2.6	3.05+11.96

Values are mean ± SD, unless otherwise stated.

Table-5: Gender Wise Prevalence Oof Anaemia, Iron Deficiency and Iron Deficiency Anemia Among Children

	N=218	Boys (114)	Girls (114)
Anemia (Hb < 11.5 g/dl) %	58.5	50.5	66.5
Iron deficiency (serum ferritin< 12 µg/L) %	49.3	43.3	54.9
Iron deficiency (TS <20%) %	35.9	32.7	39.1
Iron deficiency anemia (Hb< 11.5 g/dl; SF< 12 µg/L)%	40.3	33.7	47.0
Serum zinc deficiency (< 650µg/L) %	0.5	-	1.0
Infection(CRP > 8mg/L) %	6.0	5.8	6.2

Figure-1: Gender Wise Prevalence of Under Nutrition and Anaemia Among Children As Per (NFHS-3)