A Study on Nutritional Status of Rural School going Children in Kavre District

Mansur DI, Haque MK, Sharma K, Mehta DK, Shakya R

Department of Anatomy

Kathmandu University School of Medical Sciences

Dhulikhel, Nepal

Corresponding Author

Dil Islam Mansur

Department of Anatomy

Kathmandu University School of Medical Sciences

Dhulikhel, Nepal

E-mail: drdilislam@gmail.com

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ABSTRACT

Background

Childhood is a time of active growth in terms of physical size, mental, emotional and psychological development. Normal growth is dependent on adequate nutrition and encompasses major transformations from birth to adulthood. Nutrition is a focal point for health and well being; and has special significance in countries with disadvantages in socioeconomic and hygienic standards.

Objective

The objective of the present study was to assess the nutritional status in terms of prevalence of underweight, stunting and thinness among rural school going children.

Method

The present study was cross-sectional study, conducted on 438 rural school going children (169 male and 259 female) with the age group 4-16 years, during the period from April 2014 to July 2014. Age was recorded in year; height and weight were measured in centimeter and kilogram respectively. BMI was calculated by using standard equation.

Result

The present study concluded that the nutritional status in terms of prevalence of underweight, stunting and thinness were found to be 30.85%, 24.54% and 10.05% respectively among rural school going children of Kavre district. It was revealed that 37.87% was underweight, 29.59% was stunted and 11.25% was thinness among male children whereas in female children, 26.27% was underweight, 21.24% was stunted and 9.27% was thinness. Hence, high prevalence of underweight, stunting and thinness were observed in male than in female children.

Conclusion

The present study has successfully documented the nutritional status in terms of prevalence of underweight, stunting and thinness among the rural school going children of Kavre district. The results of the present study will be useful for policy makers in their endeavor to formulate various developmental and health care programs.

KEY WORDS

Age, anthropometry, BMI, children, stunting, thinness, underweight.

INTRODUCTION

Nutritional status is the condition of health of an individual as influenced by nutrient intake and utilization in the body.[1] The nutritional status is one of the best indicators of well being of population. Though there are several ways of measuring nutritional status, anthropometry is especially important during childhood and adolescence because growth may be sensitive to nutritional shortage and surplus; and it provides indicators of nutritional status and health risk. Three anthropometric measurements are often used to assess nutritional status during childhood stage: underweight (weight for age), stunting (height for age) and thinness (BMI for age).[2]

One of the major public health problem (malnutrition) is faced by children of developing countries.[3] As Nepal is one of the developing country, so the children of this country is facing the problem of malnutrition.

In 2011, Nepal Demographic and Health Survey reported that about 29% was underweight, 41% was stunted and 11% was thinness among the children under 5 years of age, based on WHO Child Growth Standards.[4] Although numerous studies were conducted to find out the prevalence of underweight, stunting, and thinness below the children of 5 years,[5-7] there were only limited studies conducted among the rest of the age group (5-16 years) in Nepalese children.

Hence, this study was conducted with the objective of assessing the nutritional status of rural school going children of Kavre District, Nepal using simple anthropometric measurements to assess any prevalence of underweight, stunting and thinness among children which can be used to determine the need for nutritional surveillance, nutritional care, or appropriate nutritional intervention program in a rural community.

METHODS

The present study was cross-sectional and descriptive study which consisted of 438 rural school going children in the age group of 4 – 16 years including 169 male and 259 female. They were selected randomly from five various schools in rural area of Kavre district, Nepal during the period April 2014 to July 2014. Ethical consideration was taken from Institutional Review Committee (IRC) prior to the study (Ref. no. 37/14). After taking permission from school authority and consent from each participant; they were explained the purpose of the study. Age, height and weight were recorded in year, centimeter and kilogram respectively. BMI was calculated by using standard equation. Any participant having any physical disabilities and congenital anomalies were excluded from the study.

Age

Age was recorded simply asking date of birth from each participant and was verified from school record book in year.

Height

Height of each participant was measured in centimeter using stadiometer in anatomical position with bare feet.

Weight

Weight was measured in kilogram by the help of weighing machine. The participants were made to dress lightly with bare feet in erect position.

Body Mass Index (BMI) was derived by using the standard equation.

BMI= weight (kg)/height (m^2).

Statistical analysis

The data was recorded and analyzed by using Microsoft Office Excel 2010. The anthropometric analysis was performed using SPSS version 20 and measured the weight for age (underweight), height for age (stunting) and BMI for age (thinness).

RESULTS

In the present study, 428 rural school going children participated. Out of them 169 (39.49%) were male and 259 (60.51%) were female between the age of 4 to 16 years.

The age wise distribution of minimum, maximum and mean with standard deviation of weight and height of children were shown in Table 1. Age and gender wise comparison of weight of children with WHO standard were given in Table 2 and 3. It was found that the prevalence of underweight was 64 (37.87%) among male and 68 (26.27%) among female children. Hence, it was concluded that the prevalence of underweight was found to be higher among male than female children with significant differences ($p<0.05$). But, in each age the prevalence of underweight between male and female was not statistically significant ($p>0.05$). The overall prevalence of underweight was 30.85% as shown in Table 8.

Age and gender wise comparison of height of children with WHO standard were shown in Table 4 and 5. According to WHO standard on height for age (stunting); it was revealed that the prevalence of stunting was 50 (29.59%) among male and 55 (21.24%) among female children. Therefore, it was observed that the prevalence of stunting was more among male than female children which was statistically significant ($p<0.05$). With the consideration from prevalence of stunting between male and female of each age, the differences were not statistically significant ($p>0.05$). The overall prevalence of stunting was 24.54% among children as shown in Table 8.

Table 6 and 7 shows age and gender wise comparison of BMI of children with WHO standard. On the basis of WHO

Table 1. Age and gender wise distribution of height and weight of children

Age (yrs)	Gender	Weight (kg)				Height (cm)			
		Min	Max	Mean ±SD	P-value	Min	Max	Mean ±SD	P -value
4	Male	10.5	15	12.33±2.36	1.43	90	92	89.3±3.10	0.820
	Female	12.5	13	12.67±0.29		90.4	95.8	93.83±2.98	
5	Male	13	16	14.7±1.20	0.191	95.8	102.2	99.36±2.41	0.166
	Female	12	14	13.33±1.15		95.5	98.8	97±1.67	
6	Male	14	18	15.84±1.23	0.295	99.5	108.8	104.26±3.02	0.358
	Female	12.5	18	15.27±1.75		98.5	110.5	102.81±3.57	
7	Male	15	21	17.14±2.39	0.141	99.3	119.1	107.08±6.43	0.145
	Female	15	26.1	19.05±3.19		103.4	125.6	111.98±7.08	
8	Male	17	22.5	19.35±2.73	0.625	109.3	123.3	114.52±5.26	0.900
	Female	16.5	25	19.5±2.56		108.1	129.4	115.75±5.85	
9	Male	17.5	26	22.87±2.61	0.058	107.4	129.8	121.64±5.41	0.004
	Female	19	24	20.67±1.37		110.9	124.2	118.42±4.10	
10	Male	16	36	22.81±4.14	0.001	116	136.3	123.79±6.05	0.007
	Female	20.5	47	26.20±4.69		120.8	160.3	130.31±7.40	
11	Male	22	34.5	26.15±3.39	0.024	121.8	140.4	130.3±5.34	0.035
	Female	21	44	29.30±5.45		122.7	148	134.96±7.14	
12	Male	24	36	29.67±4.45	0.017	126	145.2	135.14±5.23	0.037
	Female	20	51.4	32.28±6.69		124.2	150.6	139.33±6.26	
13	Male	29	48	35.62±5.41	0.191	132.2	151.6	144.76±8.88	0.321
	Female	28	52	37.60±5.62		138.5	158.4	148.38±7.04	
14	Male	19.5	48	35.5±7.86	0.045	131.4	158.6	146.37±9.65	0.002
	Female	31	56	42.79±6.35		140	157.8	151.22±5.10	
15	Male	34	56	46.47±6.49	0.000	145.6	174.2	161.57±6.90	0.371
	Female	37	57	45.11±4.54		145	161	153.62±4.38	
16	Male	43	66	52.69±6.93	0.000	157.1	172.5	164.98±4.39	0.006
	Female	37	52	46.27±5.49		145	159.9	149.53±8.68	

Table 2. Age wise comparison of weight of male children with WHO standard (n= 169)

Age(yr)	WHO standard range (kg)	Present study range (kg)	Total (169)	Within normal range (105)	Below normal range (64)
4	12.2-19	10.5-15	3	1	2
5	14.6-26.4	13-16	5	3	2
6	16.1-29.8	14-18	13	7	6
7	17.9-33.7	15-21	8	3	5
8	19.8-38.2	17-22.5	7	2	5
9	21.6-43.5	17.5-26	16	11	5
10	23.6-45	16-36	24	11	13
11	25-55	22-34.5	16	11	5
12	30-65	24-36	21	8	13
13	30-70	29-48	12	11	1
14	35-80	19.5-48	11	17	4
15	40-80	34-56	20	17	3
16	45-80	43-66	13	13	-
Total			169	105(62.13%)	64(37.87%)

Table 3. Age wise comparison of weight of female children with WHO standard (n= 259)

Age(yr	WHO standard range (kg)	Present Study range (kg)	Total (259)	Within normal range (191)	Below normal range (68)
4	12.5-21	12.5-13	3	3	-
5	14.2-27	12-14	3	-	3
6	15.5-30.4	12.5-18	11	6	5
7	17-36.4	15-26.1	11	9	2
8	18.9-39.5	16.5-25	22	15	7
9	21.1-45.2	19-24	18	9	9
10	23.7-47	20.5-47	32	26	6
11	25-50	21-44	24	19	5
12	30-60	20-51.4	28	21	7
13	35-65	28-52	24	18	6
14	40-70	31-56	29	21	8
15	40-75	37-57	34	31	3
16	45-80	37-52	20	13	7
Total			259	191(73.73%)	68(26.27%)

Table 4. Age wise comparison of height of male children with WHO standard (n= 169)

Age (yr)	WHO Standard range (cm)	Present Study range (cm)	Total (169)	Within normal range (119)	Below normal range (50)
4	95.4-110	90-92	3	-	3
5	99.6-126.8	95.8-102.2	5	3	2
6	104.5-133.5	99.5-108.8	13	7	6
7	109.4-139.9	99.3-119.1	8	3	5
8	114.1-146	109.3-123.3	7	3	4
9	118.6-152.1	107.4-129.8	16	13	3
10	123-158.2	116-136.3	24	14	10
11	127.5-165	121.8-140.4	16	12	4
12	132.6-172.7	126-145.2	21	14	7
13	138.8-180.5	132.2-151.6	12	10	2
14	145.8-186.7	131.4-158.6	11	7	4
15	150.8-190.7	145.6-174.2	20	20	-
16	154.8-192.8	157.1-172.5	13	13	-
Total			169	119(70.41%)	50(29.59%)

Table 5. Age wise comparison of height of female children with WHO standard (n= 259)

Age (yr)	WHO standard range (cm)	Present study range (cm)	Total (259)	Within normal range (204)	Below normal range (55)
4	92.7-116	90.4-95.8	3	2	1
5	98.5-126.5	95.5-98.8	3	-	3
6	103.2-133	98.5-110.5	11	4	7
7	108.1-139.5	103.4-125.6	11	7	4
8	113.1-146.1	108.1-129.4	22	14	8
9	118.3-152.9	110.9-124.2	18	11	7
10	123.8-159.9	120.8-160.3	32	29	3
11	129.5-166.6	122.7-148.4	24	18	6
12	135.3-172.1	124.2-150.6	28	22	6
13	140.2-175.7	138.5-158.4	24	19	5
14	143.6-177.7	140-157.8	29	26	3
15	145.7-178.3	145-161	34	34	-
16	146.7-178.4	145-159.9	20	18	2
Total			259	204(78.76%)	55(21.24%)

standard BMI for age (thinness); out of 428 children, 19 (11.25%) male and 24 (9.27%) female children were found to be having thinness. Hence, it was revealed that the prevalence of thinness was slightly more among male than female children. The differences were statistically significant ($p<0.05$). When the prevalence of thinness between male and female of each age was considered, the differences were not statistically significant ($p>0.05$). As shown in table 8, the overall prevalence of thinness was 10.05%.

Table 6. Age wise comparison of BMI of male children with WHO standard (n= 169)

Age (yr)	WHO standard (BMI)	Present study's (BMI)	Total (169)	Within normal range (150)	Below normal range (19)
4	14.1-17.8	14.19-17.2	3	3	-
5	13.1-18.3	13.42-16.34	5	5	-
6	13.2-18.7	13.45-15.44	13	13	-
7	13.3-19.3	12.61-19.77	8	7	1
8	13.4-20	13.41-15.78	7	7	-
9	13.6-20.9	13.37-17.77	16	15	1
10	13.9-21.9	10.6-19.37	24	19	6
11	14.2-23	13.8-19.09	16	14	2
12	14.6-24.1	12.93-19.97	21	19	2
13	15.1-25.2	15.01-18.99	12	11	1
14	15.6-26.3	11.25-22.58	11	8	3
15	16.2-27	13.8-22.31	20	18	2
16	16.7-28	15.49-24.62	13	12	1
Total	-	-	169	150(88.75%)	19(11.25%)

Table 7. Age wise comparison of BMI of female children with WHO standard (n= 259)

Age (yr)	WHO standard (BMI)	Present study (BMI)	Total (259)	Within normal range (235)	Below normal range (24)
4	13.7-18	13.62-15.90	3	2	1
5	12.8-18.9	13.15-14.97	3	3	-
6	12.8-19.4	12.60-15.57	11	10	2
7	12.9-20	13.15-17.77	11	11	-
8	13-21	11.64-17.01	22	20	2
9	13.3-20	12.07-16.25	18	17	1
10	13.6-23.1	8.56-18.09	32	30	2
11	14-24.3	12.84-21.75	24	22	2
12	14.6-25.94	12.96-25.74	28	24	4
13	15.2-26.6	13.26-20.27	24	20	4
14	15.6-27.4	12.93-22.95	29	26	3
15	16.1-28.2	15.94-23.03	34	33	1
16	16.5-28.6	15.58-24.73	20	18	2
Total	-	-	259	235(90.73%)	24(9.27%)

Table 8. Overall prevalence of underweight, stunting and thinness among children

Gender		Male (169)	Female (259)	Combined (428)
Weight for age	Normal	105 (62.13%)	191 (73.73%)	296 (69.15%)
	Underweight	64 (37.87%)	68 (26.27%)	132 (30.85%)
	p- value	0.002	0.000	0.000
Height for age	Normal	119 (70.41%)	204 (78.76%)	323 (75.46%)
	Stunting	50 (29.59%)	55 (21.24%)	105 (24.54%)
	p- value	0.000	0.000	0.000
BMI for age	Normal	150 (88.75%)	235 (90.73%)	385 (89.95%)
	Thinness	19 (11.25%)	24 (9.27%)	43 (10.05%)
	p- value	0.000	0.000	0.000

DISCUSSION

The present study has concluded that the prevalence of underweight was found in 30.85% children which was almost same as the result (31.1%) reported by Ghosh and Sarkar among Santal children of Birbhum District, West Bengal, India.[8] A study was conducted by Yerpude et al. (2013) which revealed high prevalence of underweight (46.67%) in India.[9] A high prevalence of underweight (55.5%) has also been documented from Haryana, India in 2012 by Sati et al.[10] Nabag also reported a high prevalence of underweight (59.1%) from Khartoum state, Sudan,[11] and Goon et al. reported 43.4% underweight from Makurdi, Nigeria in 2011.[3] However, low prevalence of underweight has also been reported in the existing literature. Joshi et al. reported that the prevalence of underweight was 26% amongst children from Kaski district of Western Nepal in 2011.[12] Anjum et al. also reported the prevalence of underweight to be 11.1% among children from Kashmir, India.[13]

In the present study, the prevalence of underweight was higher among male children (29.59%) than female children (26.27%). The differences were statistically significant in case of overall prevalence ($p<0.05$). A similar trend has been reported by Ghosh et al. who observed that the prevalence of underweight was higher among male children (63.1%) than female children (46.09%) in Kathmandu valley in 2009.[14] In another study, Ogechi et al. also reported the higher prevalence of underweight among male (63.1%) than female children (53.6%) in Abia state, Nigeria.[15]

In the present study 75.46% of the children were normal and 24.54% were stunting but nobody was found to be tall. The extent of stunting was higher than those among children (13%) of Kaski district of Western Nepal as reported by Joshi et al. and among Kashmiri children (9.25%) as reported by Anjum et al. but lower than those reported by Nigerian study (52.7%),[12,13,15] Sudanese study (47.7%) and Indian study 44%.[11,16]

It was observed that the prevalence of stunting was higher among male (29.59%) than female children (21.24%) which was statistically significant ($p<0.05$). When the prevalence of stunting between male and female of each age was considered, the differences were not statistically significant ($p>0.05$). A similar trend of stunting has been documented in the existing literature. In a study, Medhi et al. reported that 50.1% of male and 43.1% of female children from Assam, India suffered from stunting.[17] In another study, Ogechi et al. also reported that the prevalence of stunting was higher among male (67.3%) than female children (57.8%) in Abia state, Nigeria.[15]

In contrast to the present study, Mondal and Sen observed that the prevalence of stunting was higher among female (50.1%) than male children (43.1%) from Darjeeling, India.[18] The WHO report on Regional Consultation on the nutritional status of children reported that prevalence of stunting among female was 45.00% and that among male was 20.00%.[19] But a study conducted in Kathmandu valley reported that the prevalence of stunting was almost same among male (45.57%) and female children (43.42%).[14] The basic reason behind stunting indicates the long term cumulative inadequacies of health and nutrition and an insufficient intake of nutrients during the early stage of childhood.[18]

In the present study BMI for age was utilized as an indicator of thinness. The WHO expert committee has recommended that it is the best indicator for the children to assess thinness.[2] There are a number of studies reporting the prevalence of thinness utilizing BMI for age as an indicator among Nepalese children.[5-7]

In the present study, it was concluded that the prevalence of thinness among children was found to be 10.05% which was almost same as compared to the finding (12%) reported by Joshi et al. among children of Kathmandu valley.[12] In contrast to the present study, Anjum et al. reported that 29% were thinness in Kashmiri children.[13] A high prevalence of thinness (40.94%) has also been documented from West Bengal, India in 2011 by Maiti et al.[20] However, low prevalence of thinness (9.27%) has also been reported in a study conducted by Shivaramakrishna et al.[21]

The present study also revealed that the prevalence of thinness was slightly higher among male (11.25%) than female children (9.27%). A similar trend has been reported by Mondal and Sen who observed in case of thinness that male was more affected than female (52.1% versus 32.0%) in Darjeeling.[18] Rao et al. utilizing The National Nutrition Monitoring Bureau data reported a similar trend regarding the prevalence of thinness among tribal male (63.0%) and female (42.0%) from nine Indian states.[22] In another study, Venkaiah et al. also reported that the prevalence of thinness was higher in male (53.1%) than in female (39.5%).[23]

CONCLUSION

The present study has successfully documented the nutritional status in terms of prevalence of underweight, stunting and thinness among the rural school going children of Kavre district. There was a very high prevalence of underweight, stunting and thinness among male than in female children. The results of the present study will be useful for policy makers in their endeavor to formulate various developmental and health care programs. Nutritional intervention is also necessary to ameliorate the nutritional status among the children.

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REFERENCES

1. Singh JP, Kariwal P, Gupta SB, Singh AK, Imtiaz D. Nutritional status and morbidity among school going children: A scenario from a rural India. *Sch J App Med Sci* 2014;2(1D):379-83.
2. World Health Organization. Physical status: the use and interpretation of anthropometry. Technical Report Series No. 854. Geneva: World Health Organization 1995.
3. Goon DT, Toriola AL, Shaw BS, Amusa LO, Monyeki MA, Akinyemi O, Alabi OA. Anthropometrically determined nutritional status of urban primary school children in Makurdi, Nigeria. *BMC Public Health* 2011; 11:1-8.
4. Population Division Ministry of Health and Population. Nepal Demographic and Health Survey 2011 Preliminary Report. New ERA, ICF Macro 2011.
5. Rijal P, Sharma A, Shrestha S, Upadhyay S. Nutritional assessment of children at Nepal Medical College Teaching Hospital. *Health Renaissance* 2011;9(3):184-8.
6. Acharya D, Gautam S, Kaphle HP, Naupane N. Factors Associated with Nutritional Status of Under Five Children in Rupandehi District of Nepal. *Journal of Health and Allied Sciences* 2013; 3(1):56-9.
7. Anthropometric and mortality surveys, Mugu and Humla districts, Nepal, April 2007 Final report: 17-9.
8. Ghosh JR, Sarkar A. Prevalence of Undernutrition among Santal children of Birbhum District, West Bengal, India. *Sri Lanka Journal of Child Health* 2013; 42(3):147-50.
9. Yerpude PN, Jogdand KS, Jogdand M. A Study of Health Status among School going Adolescents in South India. *International Journal of Health Sciences and Research* 2013; 3(11):8-12.
10. Sati V, Dahiya S. Nutritional Assessment of Rural School-Going Children (7-9 Years) of Hisar District, Haryana. O*pen Access Scientific Reports* 2012; 1(7):1-4.
11. Nabag FO. Comparative Study of Nutritional Status of Urban and Rural School Girl's Children Khartoum State, Sudan. *Journal of Science and Technology* 2011; 12(2):60-8.
12. Joshi HS, Gupta R, Joshi MC, Vipul M. Determinants of Nutritional Status of School Children - A Cross Sectional Study in the Western Region of Nepal. *National journal of integrated Research in medicine* 2011;2(1):10-5.
13. Anjum F, Abid AM, Iqbal MP, Bhat IA. Nutritional Status of School Age Children (5-14 years) in a Rural Health Block of North India (Kashmir) Using WHO Z-Score System. *Online Journal of Health and Allied Sciences* 2012; 11(2):1-3.
14. Ghosh A, Adhikari P, Chowdhury SD, Ghosh T. Prevalence of undernutrition in Nepalese children. *Ann Hum Biol* 2009; 36(1):38-45.
15. Ogechi UP. Nutritional Status and Energy Intake of Adolescents in Umuahia Urban, Nigeria. *Pakistan Journal of Nutrition* 2007;6(6): 641-6.
16. Dey I, Biswas R, Ray K, Bhattacherjee S, Chakraborty M, Pal PP. Nutritional status of school going adolescents in a rural block of Darjeeling, West Bengal, India, *The health* 2011; 2(3):75-7.
17. Medhi GK, Hazarika NC, Mahanta J. Nutritional status of adolescents among tea garden workers. *Indian J Pediatr* 2007; 74:343-7.
18. Mondal N, Sen J. Prevalence of stunting and thinness among rural adolescents of Darjeeling district, West Bengal, India. *Italian Journal of Public Health* 2010; 7(1):54 – 61.
19. World Health Organization. Nutritional Status of Adolescents Girls and Women of Reproductive Age. Report of Regional Consultation. Geneva: World Health Organization, SEA/NUT/14, 1998.
20. Maiti S, Chattterjee K, Ali KM, Ghosh D, Paul S. Assessment Of Nutritional Status Of Rural Early Adolescent School Girls In Dantan-II Block, Paschim Medinipur District, West Bengal. *National Journal of Community Medicine* 2011; 2(1):14-8.
21. Shivaramakrishna HR, Deepa AV, Sarithared M. Nutritional Status of Adolescent Girls in Rural Area of Kolar District – A Cross-Sectional Study. *Al Ameen Jornal of Medical Science* 2011; 4(3):243-6.
22. Rao KM, Laxmaiah A, Venkaiah K, Brahmam GN. Diet and nutritional status of adolescent tribal population in nine states of India. *Asia Pac J Clin Nutr* 2006; 15:64-71.
23. Venkaiah K, Damayanti K, Nayak MU, Vijayraghavan K. Diet nutritional status of rural adolescents in India. *Eur J Clin Nutr* 2002; 56:1119-25.