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Original Article

Nutritional Status Assessment of Adolescent School Going Children in Solukhumbu, Nepal

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ABSTRACT

Introduction: Around 25% of the total population in Nepal is adolescent (10 to 19 years old). Nutritional programs in Nepal are targeted to young children and pregnant women but neglected among adolescent. Such approach may result poor nutritional status among them. This will lead poor health outcome and poor academic performance among school children. Thus we aimed to study nutritional status assessment of adolescent school children in Solukhumbu.

Material and Methods: It was a cross sectional study conducted over a period of two and half months (May-July 2018) in a government school at Salleri, Solukhumbu, Nepal. Study participants are 192 students, both male and female, from age group 10 to 17 years old. Body Mass Index and Height for age was determined by anthropometry. Interview was done by using structured questionnaires to elicit socio-demographic variables.

Results: Among 192 students age 10-17 years old, 122(63.5%) were female and 70(36.5%) were male. Majority was Janajati 160(83.3%), Major religion was Hindu 99(51.6%) and Buddhist 93(43.2%), Agriculture was the major occupation of both parents. Literacy rate of father is 63.2% and mother is 39.9 percent. Majority are underweight 53(27.6%), overweight 11 (5.7%) and obese 3(1.6%). Median Height for Age was 94 (±6.5) with minimum 76 and maximum 112 and 99(51.6%) are stunted.

Conclusions: Stunting, underweight and overweight were prevalent among adolescent children in the school. Causes of these problems should be identified by doing further research and intervention should be done accordingly.

Key Words: BMI; Children; Nutrition; Solukhumbu; Stunting

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INTRODUCTION

World Health Organization (WHO) has defined adolescent is the period between 10 to 19 years old.[1] A population report submitted to ministry of population showed that around 24% of Nepal's 28.5 million populations are adolescents aged 10–19 years with annual growth rate of 1.7 percent.[2] Adolescence period is a transitional stage that occurs between childhood and adulthood and it is the period that Pubertal and growth spurt occurs. This demands increase calorie and nutrient need during this period. Adolescent is the very crucial period when it comes to nutrition because adolescence is a period in which rapid growth occurs and it provides opportunity to gain weight and height even for previously malnourished children, provided that the environment

is positive for better nutrition. In other hand if Adolescence malnutrition is not prevented on time then it may lead serious consequences like poor outcome of health in adulthood and poor birth outcome like low birth weight.[3,4] Furthermore malnourished children in school has not only impact on their health but also in school performance.[5] Despite the fact that adolescence malnutrition can cause significant impact on health and disease, nutritional program in Nepal are only targeted to young children and pregnant women. This has been evidenced that even recent national level survey did not include nutritional status of adolescent.[6] So, in this study, we aim to identify nutritional status assessment of school going children in Solukhumbu.

MATERIALS AND METHODS

This is a cross sectional study carried out in a government school at Salleri, Solukhumbu from 10-02-2075 to 29-03-2075. School children from grade 6 to 10 with age group 10 to 19 years old were included in the study. Approval from concerned School and District Health office, Solukhumbu was received to carry out the study. School has notified parents about the purpose of our study one week before the study was planned.

Sample size was calculated by taking prevalence of low BMI as 36 % among adolescent in Nepal as mentioned in report published by WHO.[7] Confidence Interval 95% and 10 % error of margin were used. N= z2 P q/d2 formula was used. Required sample size was 65 but we included 192 students who were willing to participate in the study. Exclusion criteria were student's age less than 10 years and more than 19, married and pregnant, sick children not able to stand to measure height and weight, diagnosed to have any illness or disease for more than three months, unwilling to participate.

School Health program on eye health checkup was conducted by District Community Eye Center (DCEC) Solukhumbu in this school and during that time every Friday 1 to 4 pm were allocated by school to conduct our study for the whole month of Jestha and Ashad 2075.Structured questionnaire were used for face to face interview.

Variables used in the study were age, sex, ethnicity, grades, and Parents' occupation, Parents' level of education, Students' height and weight. Data collection was done by ophthalmic health worker and class teacher who were trained to take height and weight and interview technique. Age was taken in years. Height and weight was measured in classroom set up with enough natural light. Height was measured by measuring tape and weight was measured by digital weighting scale. To maintain the accuracy of equipment used for anthropometry, weighing scale was checked regularly one day prior conducting data collection by weighing known weights and if the weights were not accurate, weighing scale was calibrated and the display was ensured to read 0 kg for accurate measurement of height new measuring tape which can be easily readable, not worn out were used.

WHO guidelines was followed to measure height and weight accurately and interpretation were done accordingly.[8]

Weight measurement:

1. Digital weighing machine was placed on firm floor.
2. Students were asked to remove shoes and bulky clothing like sweater and jacket.
3. Students were asked to stand straight with both feet in the center of scale.
4. Weight was recorded in Kg to nearest 100 gm.

Height measurement:

1. Room with well natural light, firm flooring and wall with no molding was selected for height measurement.
2. Students were asked to remove shoes, bulky clothing, hair ornaments and cap.
3. Students were asked to stand with feet flat, together and against the wall with straight legs, arms at side, head, shoulder, buttock and heel touching the wall and looking straight ahead and advised not to lean backward, forward, and sideward.
4. After students stand correctly flat board was placed on the top of head and measurement was done by measuring tape and reading was done in centimeter to the last completed 0.1 cm.
5. Measurement in centimeter is converted to meter and recording was done.

Body Mass Index (BMI) is commonly used anthropometric index to assess malnutrition for adult, adolescence and children. It is calculated by using the formula (Wt. in Kg/Height in meter squared). WHO BMI classification was used in the study. Same classification was also used in Adolescent Nutrition Survey, 2014 conducted in Nepal.[9] WHO classification categorize BMI less than 18.5 as underweight, 18.5 to 24.9 as normal weight,25-29.9 as overweight and 30 or more than 30 as obese.[10,11] Height for age was calculated by using WHO reference height for age.[12] Severity of stunting was classified based on waterlow classification.[13]

Data entry was done in Statistical Package of Social Science (SPSS) version 20. After finishing data collection data entry was done on the same day. Any missing data, outliers etc. were identified and corrections were made immediately. Double data entry was done to minimize the recording error. Data analysis was done descriptively using Statistical Package for social sciences (SPSS) version 20.

RESULTS

A total of 192 adolescent children were included in the study with slight female preponderance (F:M- 1.74:1). Children of 10-14 age group comprised of 57.8 (n=111) percent. Socio-demographic characteristics of the study population are shown in table 1.

Table1: Socio-Demographic Characteristics of Adolescent School Going Children (N=192)

Socio-demographic characteristics	Frequency (N)	Percentage (%)	Socio-demographic characteristics	Frequency (N)	Percentage (%)
Age	111	57.8	**Gender**	70	36.5
10-14 years	81	42.2	Male	122	63.5
15-17 years			Female		
Religion	99	43.2	**Ethnicity**	160	83.3
Hindu	93	51.6	Janajati	18	9.4
Buddhist	9	4.7	Brahmin/Chhetri	14	7.3
Christian	1	0.5	Dalit		
Muslim					
Father's occupation	105	54.4	**Mother's Occupation**	96	96
Agriculture	34	17.6	Agriculture	54	54
Business	25	13.0	Home Maker	35	35
Home Maker	16	8.3	Business	5	5
Foreign worker	12	6.2	Office worker	2.	2.
Office worker			Foreign worker		
Father's Education	71	36.8	**Mother's Education**	116	60.1
Illiterate	81	42.0	Illiterate	54	28.0
Below SEE	29	15.0	Below SEE	18	9.3
SEE to Bachelors level	11	5.7	SEE to Bachelors level	4	2.1
Above bachelor's level			Above bachelor's level		

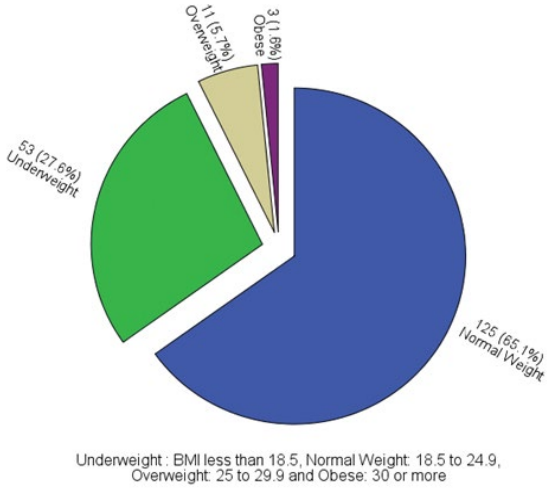

Figure 1: BMI category of adolescent school going children (n=192)

Out of total 192 children, 125 (65.1%) were in normal category of BMI, followed by 53 (27.1%) in underweight (fig.1). Table 2 showed that proportion of students with underweight an overweight problem are more among age group 10-14 compared to age group 15-17. This is statistically significant with P value (0.00).

Median Height for Age was 94.31(±6.5) with minimum 76.45 and maximum 111.86. Normal height was seen in 93 (48.4%) children and 99 (51.6%) children were stunted (table 3)

Table 2: BMI Category* Age Category Cross tabulation (N=189)

			Age Category		Total
			10-14 years	15-17 years	
BMI Category	Normal	Number	59	66	125
		Expected Count	72.8	52.2	125.0
		% within BMI_category	47.2%	52.8%	100.0%
	Underweight	Number	44	9	53
		Expected Count	30.8	22.2	53.0
		% within BMI_ category	83.0%	17.0%	100.0%
	Overweight	Count	7	4	11
		Expected Count	6.4	4.6	11.0
		% within BMI_ category	63.6%	36.4%	100.0%
Total		Number	110	79	189
		Expected Count	110.0	79.0	189.0
		% within BMI_ category	58.2%	41.8%	100.0%

$X^2(2) = 19.77$, $P \leq 0.05$

Table 3: Height for age according to Waterlow classification. (N=192)

Classification	Frequency(N)	Percentage (%)
Normal Height	93	48.4
Mild Stunted	46	23.9
Moderate Stunted	40	20.9
Severe Stunted	13	6.8
Total	**192**	**100**

DISCUSSION

Study participants were 192 students from grade 6 to 10 with age group 10-17 years, with median age of 14 years. Students from 10-14 years were more than 15-17 years old and female students (63.5%) were almost twice more than male students (36.5%). District Profile of Solukhumbu, mentioned that proportion of male and female who have passed secondary level is almost same 50% female and 49% male. The low proportion of male students in our finding may be because the data was taken from government school and there might be tendency that male students were sent to private school. Recent news published in Kathmandu post shows that there is parental preference of sending their male children to Private School while sending female children to public school. Other socio-demographic characteristics like ethnicity, religion, parent's level of education and occupation are similar as mentioned in District profile of Solukhumbu.[14]

Nutritional status assessment by taking BMI showed that 63(34.9%) are malnourished. Majority of adolescent 53(27.6%) were underweight. This finding is supported by the report published by UNICEF, which includes adolescence nutritional survey in South Asia and Sub Saharan Africa.15 Overweight and obesity were noted among 14(7.35%) in our finding. This indicates that the adolescent school children are under double burden of malnutrition. However there was no statistical significance but our study found majority of students who are underweight, stunted and over -weight are among female, parents low education level and parents whose occupation are agriculture.

Regarding height of students, our study showed only 93(48.4%) had normal height for age. Proportion of students who are stunted are 99(51.6%) and among them mild stunted 46(23.9%), followed by moderately stunted 40 (20.9%) and severely stunted 13(6.8%). High prevalence of stunting among adolescence indicates that there might be also more nutritional problem among young children. This is because stunting is one of the most common manifestations of chronic malnutrition and children who had chronic malnutrition at young age may have tendency to have stunting in adolescent period. In our study cross tabulation of BMI category versus Age category (10 to 14 and 15 to 17) showed that underweight and overweight are occurred more among age group 10-14 compared to age group 15-17. This is statistically significant with P value (0.00). This finding is also supported by the study conducted in seven African Countries.[16] So, regular monitoring of height and weight in school from early grades and identifying its causes through multifactorial approach, is mandatory to prevent chronic malnutrition later in life. Study conducted in semi urban community in Lalitpur , Nepal showed almost similar finding as our fining but stunting was almost double than our study.[17] Less proportion of severely stunted in our study may be that our study population are school going children and who may be more privileged and had less chance of under nutrition. A study conducted among school going adolescence children in Kavre showed 31.98% underweight, 21.08% stunted and 14.94% low BMI for age.[18] This finding is lesser than our proportion of underweight, stunting and less BMI for age in our study. This difference may be because our study population is from more remote area of Nepal. This may cause difficulty in access of food. Study conducted in Nigeria has shown that mother's level of education is associated children's nutritional outcome.[19] Our study also showed both underweight and overweight are more seen among children whose mother's level of education are low (Illiterate and or below SEE) and father's and mother's occupation is agriculture. Though occurrence was more but not statistically significant. This may be because of the limitation of small sample size in our study. So bigger study, in future, should be conducted to see the association of different variables. This will help to formulate policy for intervention of nutritional program.

Despite the fact that nutrition requirement at different stages of life is important, nutritional status assessment in adolescent is neglected. Nutritional deficiency in one stages of life can cause significant health impact in other stage of life and also may have trans- generation impact. In a country like Nepal, where adolescence marriage is very common and low birth weight is also high, it is very important to assess their nutritional assessment especially of female children, not only for the sake of adolescence health but also their birth outcome.

Furthermore, malnutrition in school going children has not only impact on physical health but also it can cause cognitive effect. So assessment of nutritional status assessment of school going children and with proper nutritional intervention program students' outcome in health as well as performance in study can be improved. This will eventually help them to be healthy citizen who can contribute for the betterment of the country. Our study finding with high prevalence of stunting reflects chronic malnutrition and study has shown that to combat chronic malnutrition Multi-Sectorial approach should be followed..[20] Thus we recommend the same.

CONCLUSIONS

Significant proportion of School going adolescent both male and female were found underweight, overweight and stunted. This is very alarming as it leads serious negative consequences in both health academic outcomes. This will have negative impact on development of country as a whole. Higher proportion of malnutrition among young adolescent (10-14) in our study indicates the need of regular screening of malnutrition at early age or at-least once at school entry at the age of six to prevent further deterioration or occurrence of malnutrition later in life.

Therefore we recommend that school health program and health education pertaining to malnutrition should be initiated in the school immediately and screen every child in school from entry level throughout their adolescent period. This will help timely intervention and help to prevent further deterioration.

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