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THE PREVALENCE OF ANAEMIA AND MORBIDITY PROFILE AMONG SCHOOL GOING ADOLESCENT GIRLS OF URBAN KATHMANDU, NEPAL

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ABSTRACT:

A perusal of the literature on anaemia prevalence in Nepal from 1975 onwards highlighted two points: anaemia prevalence is high particularly among women and children and that adolescent girls as a group have not been studied much, in fact, the adolescent period is one of the critical periods for anaemia. The present study assessed prevalence of iron deficiency anaemia and morbidity problems of adolescent girl. The results highlighted anaemia as a public health problem in girls and its prevalence was found to be higher in Brahmins girls as compared to Newars and Chhetries. Eighty-two percent of the girls reported health problems such as aches and pains in the body, infectious morbidities, and weakness and breathlessness. Thus, this female population groups needs to be paid special attention for health promoting intervention program.

Key words: Anaemia, morbidity, adolescent girls.

INTRODUCTION:

It is reported that 2170 million people are affected worldwide by nutritional anaemia. Out of these, 90% live in developing countries. Among these developing countries, South East Asia has the highest prevalence of anaemia.[1] The prevalence of iron deficiency anaemia in developing countries as a whole is 36% whereas it is only 8% in developed countries.[2] The prevalence of anaemia is high in women of reproductive age, 47% across developing countries, and it worsens to 57% during pregnancy.[3] The prevalence of anaemia among rural Nepalese adolescent of both sex was 42%.[4]

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A perusal of the literature on anaemia prevalence in Nepal from 1975 onwards showed that most studies had focused on women and children.[4,5,6,7,8] The prevalence data varied from one study to another which could have arisen in part due to the different haemoglobin cut-off levels used and different methods of estimating haemoglobin. However, the data highlight two points: anaemia prevalence is high in most age groups and adolescent girls as a group have not been studied much. Thus, the present study was carried out with the **objectives:** to assess prevalence of iron deficiency anaemia and morbidity profile on school-going adolescent girls, aged 10 to 18 years in Kathmandu. Anaemia may be a cause of impaired immune responses resulting in infectious morbidities due to low haemoglobin levels.[9]

STUDY DESIGN AND METHODS:

The present study was carried out in the Urban areas of Kathmandu District, Central Development Region of Nepal. The Kathmandu District covers an area of 395 Sq. Km. with mean household size of 5.3 as per the Central Bureau of Statistics in 1996.[10] The girls from low and middle income households, were selected through schools that catered to the underprivileged population. Four government-aided schools in Kathmandu City were selected for the study. Before selecting the schools, permission to conduct the study was sought and obtained from Nepal Health Research Council. All girls attending the four schools were enlisted as subjects and a total of four hundred twenty girls aged 10 to 18 years from the four schools were randomly selected after taking consent from their parents.

Socio-demographic data were collected on all subjects at baseline. A structured questionnaire was developed and pre-tested on adolescent girls of a school other than the ones selected for the study. The pre-tested questionnaire was modified after pre-testing and finalized. The demographic status, which consisted of information on ethnic class, family composition, size of the family and the type, per capita income, expenditure on food, education and occupation of parents, type of house, drainage facilities, source of drinking water and toilet facilities and dietary consumption such as tea, non-vegetarian foods, and citrus fruits were also recorded in order to test their relationships with iron status.

For haemoglobin estimation , direct elution of cynmethemoglobin method was used in all the subjects.

Morbidity profile of the subjects was gathered through an interview using a pre-tested and finalized interview schedule. Morbidity data were collected over a reference period of six consecutive school days. The proforma consisted of questions on type of morbidities, episodes and duration of the morbidities. It also consisted of health complain of the girls categorized under three subheadings namely upper respiratory infection (URI), gastrointestinal infection (GI) and infection of skin, eyes and ear. The investigator visited the subjects in school everyday in the morning and asked each student if they had suffered from any illness in the previous day. Daily records for 6 days were kept for each subject from which episode and duration of morbidity was derived later on. An episode of illness was defined as one or more days of a particular morbidity preceded by at least one symp-

tom-free day. When two or more types of morbidity were experienced by the subjects at the same time, each type of morbidity was recorded as one episode. Duration was defined as the number of days for which the subject reported of a particular morbidity. If two morbidities occurred together, the number of days suffered was taken as duration.

The data on socio-demographic, haemoglobin level, morbidities were analysed using programmes of the Statistical Package for Social Sciences/PC+ and mainly mean, percentage, chi-squire and F-test were computed and interpreted.

RESULTS:

Using the 1992 FAO/WHO cut-off levels (haemoglobin less than 120g/L as normal)[11] it was found that 60.5% subject were anaemic. Out of which, 57.4% were mildly anaemic and 3.1% were moderately anaemic and interesting finding was that the severe anaemia was absent.(Table 1) The data were analysed to determine if mean haemoglobin and the prevalence of anaemia were different for younger and older subjects. No significant differences in the prevalence of anaemia or in mean haemoglobin levels between different age group was observed.

Table 1
Prevalence of degress of anaemia in subjects studied by age group (N=420)

Age group	Prevalence of degrees of anaemia								Mean Hb ± SE
	Normal Hb ≥120 g/L		Mild Hb 100-119 g/L		Moderate Hb 70-99 g/L		Severe Hb <70 g/L		
	N	%	N	%	N	%	N	%	
10 -13 y (N=107)	38	35.5	66	61.7	3	2.8	-	-	115.4 ± 8.4
13 - 16 y (N=253)	107	41.9	140	55.3	7	2.8	-	-	117.2+10.1
16-18 y (N=60)	22	36.7	35	58.3	3	5.0	-	-	116.0±12.6
Total 10-18 y	167	39.8	241	57.4	13	3.1	-	-	

Chi-square value for agewise prevalence of anaemia 2.28 ^{NS}
F / Ratio for agewise mean haemoglobin 1.29 ^{NS}

Prevalence of anaemia and mean haemoglobin levels of the subjects by ethnicity are shown in Table 2. The highest prevalence of anaemia was seen among Brahmins (66.7%) as compared to 55.4% in Chhetries and 52.3 % in Newars, although this was not statistically significant. The mean haemoglobin levels however were significantly higher ($p<0.01$) in Newars (119.3g/L) and in Chhetries (117.4g/L) as compared to the Brahmins(114.8g/L).

Table 2
Percent prevalence of different degrees of anaemia by ethnicity (N=420)

Ethnic group	Hb level (g/L) Mean Hb ± SE	Normal Hb≥120 g/L		Anaemic (<120 g/L) Mild Hb 100-119.9		Moderate Hb 70-99.9	
		N	%	N	%	N	%
Brahmins (A) (N=153)	114.8 ± 9.6	51	30.7	94	39.0	8	61.5
Chhetris (B) (N=112)	117.4 ± 9.9	50	30.1	60	24.9	2	15.4
Newars (C) (N=88)	119.3 ± 10.5	42	25.3	45	18.7	1	7.7
Others (D) (N=67)	115.9 ± 10.4	23	13.9	42	17.4	2	15.4
Total (N=420)	117.0 + 10.1	166	39.5	241	57.4	13	3.1

Chi-square value 9.794 NS
F / Ratio 4.22 **

Group	't' Value
A vs B	2.13*
A vs C	3.43***
A vs D	0.76NS
B vs C	1.36NS
B vs D	0.96NS
C vs D	2.05*

* *Significant at P < 0.05*
*** *Significant at P < 0.001*
NS - Non Significant

As depicted in Table 3, 82% reported various types of morbidities such as infectious morbidities, aches and pains, anaemia related complaints and some allergies. Aches and pains topped the list of morbidities with more than 50% of the girls suffering from this problem. The second highest (33%) morbidity was anaemia related such as weakness, breathlessness, and tiredness, while 15.7% reported upper respiratory tract infection.

Table 3
Mean haemoglobin levels (g/L) and number and percent of subjects anaemic and non-anaemic by type of morbidities

Type of morbidities	Mean Hb ± SE	Anaemic N	Anaemic %	Non-anaemic N	Non-anaemic %
Infectious	118.0 + 9.7 (N=138)	77	55.8	61	44.2
Aches and pains	116.3 + 10.4 (N=408)	250	61.3	158	38.7
Anaemia related	118.1 ± 10.6 (N=140)	76	54.3	64	45.7
Allergy and bleeding from nose	117.5 ± 11.5 (N=26)	15	57.7	11	42.3
Presence of morbidity	116.7 + 5.6 (N=345)	204	80.3	141	84.9
Absence of morbidity	116.1 ± 10.8 (N=75)	50	19.7	25	15.1

The haemoglobin levels in relation to morbidity shows neither the prevalence of morbidities nor specific types appeared to have any significant effect on mean haemoglobin level. The data were further analysed to determine if any difference existed in mean duration and mean episode of the morbidities experienced by the anaemic and non-anaemic subjects and the results are reported in Table 4.

Table 4
Anaemia in relation to episodes and durations of morbidity (N=420)

Hb status of the subject	N	Mean episode of morbidities Mean + SE	Mean duration of morbidities Mean + SE
Anaemic Hb < 120 g/L	254	1.16 + 0.08	2.91 + 0.13
Non-anaemic Hb > 120 g/L	166	1.19 + 0.05	3.18 + 0.15
't' Value		0.75NS	1.17NS

NS - Non significant

DISCUSSION:

Four hundred and twenty adolescent girls from four government schools having similar background, were selected because children from lower middle and low income are usually catered by these school. These subjects belonged primarily to lower socio-economic groups, the average income of the families of these subjects being Rupees 1121 per month, which was not adequate even to have a balanced diet for an average family.

The prevalence of anaemia among the girls was found to be high: 60.5% as per the epidemiological criteria of suggested by FAO/WHO.[11] When the cut-off of less than 70g/L was used, none of the subjects was severely anaemic. Thus, anaemia seen in these girls was of a moderate and mild type with haemoglobin in the range of 70g/L and less than 120g/L. The highest haemoglobin of the total sample was 117.0 ±10.1g/L. Agewise mean haemoglobin level of the subjects in the present study as compared with affluent Indian girls was lower but similar to the prevalence reported for low income rural adolescent girls.[12] However, prevalence data found to be higher in comparison with Bangladesh (22%) and 36% in SriLanka.[13,14] The only other study available on adolescent girls in Nepal used a cut-off point of 115g/L. If this cut off level is used the prevalence of anaemia in the present study is 39%, as against 42% reported in the previous study.[4]

The haemoglobin and presence or absence of anaemia in the subjects when analysed in relation to several socio-demographic factors showed that only ethnicity made a difference, with Chheris and Newars showing higher mean haemoglobin and lower prevalence of anaemia . Except ethnicity of none of the socio-economic characteristics tested emerged as variables affecting haemoglobin levels . This in these population ethnicity was a major determinant of haemoglobin levels. Further analysis revealed that ethnicity differences were in part due to dietary habits, the Newars & Chhetries consumed non-vegetarian foods more frequently than Brahmins. This was supported by the analysis of haemoglobin levels of vegetarian versus non-vegetarians subjects with significant difference in mean haemoglobin in the levels of vegetarian i.e. 109g/L and that of non-vegetarians 113.8g/L. Relationship between tea drinking, citrus fruit consumption and haemoglobin levels when explored, indicated the expected relationships, that tea inhibits iron absorption and ascorbic acid found in citrus fruits increases iron absorption are well documented.[15,16,3]

Adolescent is generally considered to be characterized as a time of being relatively free of health problems. However, 82 % of the subjects in this study reported one or other type of morbidities: infectious morbidities (32%) and aches and pains (96%) anaemia related (33%) and allergies (5%). Even considering that self-reported morbidities may tend to overestimate or underestimate the actual incidence and may not necessarily match with clinical diagnosis,[17] it is still noteworthy that a large proportion of the subjects perceived themselves to be ill with infectious or non-infectious morditities. These definitely need to be corroborated by clinical diagnosis. However, the other studies carried out in Cameroon,[18] Nepal,[4] Equador,[19] and Phillippineo-Mindana[20] have also reported 60% of fever with malaria and 47% of diarrhea among Cameroonians, 15% of diarrhea and 30% of upper respiratory tract infection(URTI) among rural Nepalese, 31% of the diarrhea among Equador and 8% in Philipino adolescent girls. The interesting finding among Nepalese girls was that the prevalence of all types of morbidities observed in the present study, was higher i.e. more than 50% among age group 13 to 16 years as compared to younger, 10 to 13 years and older 16 to 18 years

groups. The reason could be hormonal changes which occurs during adolescence particularly at the time of onset of menarche. Number of episodes and duration of morbidities did not have any significant association with the anaemic and non-anaemic status of the subjects in the present study which could be due to the presence of only mild and moderate anaemia among the studied subjects. Prema et al in 1982 had also reported that morbidities may increase only in the case of severe anaemia, i.e. haemoglobin less than 80g/L.[21] Sharma in 1996 had also reported that the mean duration of morbidities among Indian pregnant women was lowest in those with haemoglobin level $\geq$ 110g/L and the highest in those who were severely anaemic i.e haemoglobin levels less than <70g/L.[22] It may be noted that none in the present study was severely anaemic.

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