

## ARTICLE

# Anemia amongst Adolescent Girls and Boys Attending Outpatients and Inpatient Facilities in Far Western Part of Nepal

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Published: 05 November 2013

Ibnosina J Med BS 2013;5(6):330-334

Received: 26 January 2013

Accepted: 04 April 2013

This article is available from: <http://www.ijmbs.org>

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## Abstract

**Objectives:** The aim of this study was to evaluate the prevalence of anemia among adolescent males and females in the far western part of Nepal. **Patients and Methods:** A hospital-based study was carried out in Nepalgunj Medical College, Kohalpur, Banke, Nepal to determine prevalence and distribution of anemia in terms of age and gender among adolescents population. A total of 2027 adolescent (10-19 years old) females and males were included in the study from March 2011 to December 2012. Hemoglobin level was determined by the Cyanmethaemoglobin method. Data were summarized using descriptive statistics. **Results:** The overall prevalence of anemia was 52% for both males and females. 29.7% of the females and 22.4% of the males were anemic. The proportion of mild anemia was 67.5% (38.4% in females and 29.0% in males), moderate anemia was 20.0% (10.9% in females and

9.1% in males) and severe anemia was 12.5% (7.7% in females and 4.8% in males). Analyzing data within age groups revealed that the highest prevalence of anemia in general occurred in the 18-19 year old subjects affecting 292 (82 males and 210 females). **Conclusions:** Anemia in Nepalese adolescents is mostly mild, occurs more in late teenage years and it mainly affects females. Nutritional improvement and oral iron supplementation is needed for curing of anemia.

**Keywords:** Adolescents, Prevalence, Anemia, Hemoglobin, Western Nepal

## Introduction

Anemia is global public health problem affecting both emerging and developed countries with major consequences for human health as well as social

and economic growth. Anemia affects mainly women of child-bearing age, young children, and adolescent girls (1-4). About one-third of the global population (over 2 billion persons) are anemic (5). Adolescence is a transition from dependent childhood to independent and responsible adulthood. The World Health Organization (WHO) defined adolescents as the population of 10 to 19 years of age (6). It is estimated that out of the 27 million people in Nepal, around 23 percent are adolescents (7). Adolescent children are one of the major risk groups for anemia (8). The prevalence of anemia among adolescents is 27% in developing countries, and 6% in developed countries (9). Iron deficiency anemia (IDA) constitutes the major proportion of anemia during adolescent period. Accelerated development, hormonal changes, malnutrition and starting of menstrual periods in girls are major causes in this period (8-10). Because iron is an essential element for the function of various organs, its deficiency may lead to impaired perception

and learning difficulties resulting in declined school success (11). The situation of Nepal is severe where 36% of those aged 15-49 years, 42% of the pregnant women and 40% of the lactating mothers are reported anemic (12). The few studies carried out among adolescent girls in Nepal reported that prevalence ranges from 42-60 % (13-16). Only one study included male adolescents: prevalence was 56.3% (17). This study was conceived and designed with the objective to determine prevalence and distribution of anemia in terms of age and gender, among adolescent population.

### Patients and Methods

This study involved 2027 adolescent patients (aged 10-19 years inclusive) attending out-patient departments and in-patients departments of Nepalgunj medical college and teaching hospital, Kohalpur, Banke, Nepal between March 2011 and December 2012. The blood sample was taken for measurement of hemoglobin (Hb) level by Cyanmethemoglobin method in the

**Table 1.** Gender distribution of anemic and non-anemic adolescents given as number (%).

Gender	Anemic	Non-anemic	Total
Female	601 (29.65%)	503 (24.81%)	1104(54.46%)
Male	453 (22.35%)	470 (23.19%)	923 (45.54%)
Total	1054 (52%)	973 (48%)	2027 (100%)

**Table 2.** Prevalence of anemia according to gender and age groups.

Age group	Gender		Total	Prevalence rate (%)
	Female	Male		
10-11 years	55 (5.2%)	74 (7.02%)	129	12.2
12-13 years	90 (8.5%)	112 (10.63%)	202	19.2
14-15 years	135 (12.8%)	133 (12.62%)	268	25.4
16-17 years	111 (10.5%)	52 (4.93%)	163	15.5
18-19 years	210 (19.9%)	82 (7.78%)	292	27.7

central laboratory of biochemistry (18). Anemia was classified into three degrees according to WHO's criteria into mild, moderate and severe (19,20). The Hb cut-off values of mild anemia were 10.0-11.9 g/dl, for moderate anemia were 7.0-9.9 g/dl and for severe anemia was <7.0g/dl.

## Results

Of the total 2027 patients included in this study, 45.5% were males and 54.5% were females. 1054 patient were anemic and 973 were non anemic (Table 1). The

development of anemia. Therefore, girls have higher incidence of anemia (8, 20). Studies investigating the prevalence of adolescent anemia in Nepal are limited. Hence our exploratory exercise.

The present study showed a high prevalence of anemia among adolescents attending outpatient and inpatient medical services, presenting in over half of the studied sample. Prevalence of anemia was higher among females in comparison with males. Previous study at the Birat Hospital and Research

**Table 3.** The distribution of the 3 different severity grades of anemia overall and by gender. Results are presented as numbers (percentages).

Severity of Anemia	Gender		Total
	Female	Male	
Mild	405 (38.4%)	306 (29.0%)	711 (67.5%)
Moderate	115 (10.9%)	96 (9.1%)	211 (20.0%)
Severe	81(7.7%)	51 (4.8%)	132 (12.5%)
Total	601 (57.0%)	453 (43.0%)	1054 (100%)

overall prevalence of anemia was 52% for both males and females. 29.7% of the females and 22.4% of the males were anemic. The proportion of mild anemia was 67.5% (38.4% in females and 29.0% in males), moderate anemia was 20.0% (10.9% in females and 9.1% in males) and severe anemia was 12.5% (7.7% in females and 4.8% in males) (Table 3). Analyzing data per age groups revealed that the highest prevalence of anemia in general occurred in the 18-19 year old subjects affecting 292 (82 males and 210 females) (Table 3).

## Discussion

In the adolescence stage, iron need is increased due to rapid growth. In order to increase the absorption of iron, the level of ferritin decreases. Additionally, the onset of menstruation in girls results in reduced ferritin levels. Irregular eating habits and the lower consumption of animal source foods contributes to the

Centre (BHRC), Biratnagar, Morang District of Nepal 2012 showed the prevalence, among adolescents in the region, of 47.7 % and 52.3% in males and females respectively (15). Their findings and those reported here give slightly higher rates than that of 46.6% described among adolescents aged 12-18 old years in Egypt (22). In our study, we diagnosed anemia in 57.02% of the girls compared to 42.98% of the boys. The 68.8% prevalence of anemia in adolescent girls observed by others (23) is very high when compared to rates reported as low as 2% in the west. Prevalence of anemia also differ among countries within same geographical region (24-26). Al-Sharbati *et al* reported a prevalence of anemia among adolescents to be 12.9% and 17.6% in rural and urban regions in Iraq respectively (24). Greater prevalence of anemia among adolescents (14-20 years old) 21.4% was reported from Iran (25). Mikki *et al* showed widely variable prevalence rates of anemia among adolescents (13-

15 years old) from 6.0 to 22.5% for males and from 9.2 to 9.3% for females in Palestine (26). Allowing for the potential multiple causes of anemia, periodic deworming and oral iron supplementation were shown to be considered the primary courses for prevention and cure of anemia. Notwithstanding this, in the Nepalese context, strategies to reach a large section of women, children and adolescent populations are only possible through community-based health workers like female community health volunteers. The most appropriate strategies would be integrated community- and school-based approaches to reach adolescent population for prevention and control of iron deficiency anemia in Nepal.

### References

1. WHO Groups of Experts on Nutritional Anemia. Technical Report Series. WHO, Geneva 1986.
2. Indian Council of Medical Research (ICMR). Evaluation of the National Nutritional Anaemia Prophylaxis Programme-An ICMR Task Force Study. New Delhi:ICMR,1989
3. Dreyfuss ML, Stoltzfus RJ, Shrestha JB, Pradhan EK, Le Clerq SC, Khatry SK, et al. Hookworms, malaria and vitamin A deficiency contribute to anemia and iron deficiency among pregnant women in the plains of Nepal. *Journal of nutrition* 2000;130:2527-36.
4. Atukorala TMS, de Silva LDR, Dechering WHJC, Dassenaieike TS. Evaluation of effectiveness of iron folate supplementation and anthelmintic therapy against anemia in pregnancy-a study in the plantation sector of Sri Lanka. *American Journal of Clinical Nutrition* 1994; 60:286-92.
5. WHO. Micronutrient deficiency: Battling iron deficiency anemia: the challenge. Geneva, 2004.
6. WHO. Young People's Health. A Challenge for Society. WHO Technical Report Series no 731, WHO, Geneva, Switzerland 1986.
7. Central Bureau of Statistics. Population Census 2001 National Report. HMG/Nepal National Planning Commission Secretariate Central Bureau of Statistics in Collaboration with UNFPA Nepal, Kathmandu 2002.
8. Halterman JS, Kaczorowski JM, Aligne CA, Auinger P, Szilagyi PG. Iron deficiency and cognitive achievement among school-aged children and adolescents in the United States. *Pediatrics* 2001;107:1381-6.
9. Dugdale M. Anemia. *Obstet Gynecol Clin North Am* 2001;28:363-81.
10. Beard JL. Iron requirements in adolescent females. *J Nutr* 2000;130 (25 Suppl):440-2.
11. Soemantri AG, Pollitt E, Kim I. Iron deficiency anemia and educational achievement. *Am J Clin Nutr* 1985;42:1221-8.
12. MOHP Nepal, New ERA and Macro International Inc. Nepal Demographic and Health Survey 2006. Kathmandu, Nepal: MOHP, New ERA and Macro International Inc. Kathmandu, Nepal 2007.
13. Baral KP. Iron deficiency anemia: a public health nutrition problem in Nepal Implication in Policy and Program. *J Nepal Pediatr Soc* 2003; 22: 29-41.
14. Rikimaru T, Joshi N, Pandey S. Prevalence of anemia and its relevant factors among High School girls of Kathmandu Valley-Nepal. Nutrition Section, Child Health Division, MOH, WHO and JICA, Kathmandu, Nepal 2003.
15. Tiwari K. A study on anemia control among adolescent girls: Development of a school based intervention program in Kathmandu, Nepal. Doctoral thesis. Department of Food and Nutrition Faculty of Home Science, the Maharaja Sayajirao University of Baroda, Vadodara, India 2000.
16. Regmi SC, Adhikari RK. A study on the factors influencing nutritional status of adolescent girls. New ERA, Kathmandu, Nepal 1994.
17. Sinha AK, Singh Karki GM, Karna KK. Prevalence of Anemia amongst Adolescents in Biratnagar, Morang Dist. Nepal. *International Journal of Pharmaceutical & Biological Archives* 2012; 3: 1077-81.
18. WHO. Preventing and controlling iron deficiency anemia through primary health care, Geneva, 1989.
19. Kariyeva GK, Magtymova A, Sharman A. Demographic and Health Surveys: Chapter 12: Anemia. [Internet document available from [www.measuredhs.com/pubs/pdf/FR130/12Chapter\\_12-](http://www.measuredhs.com/pubs/pdf/FR130/12Chapter_12-)

- pdf; accessed 8.8.2013].
20. WHO Groups of Experts on Nutritional Anemia. Technical Report Series. WHO, Geneva 1986.
  21. Hallberg L, Rossander-Hultén L. Iron requirements in menstruating women. *Am J Clin Nutr* 1991;54:1047-58.
  22. El-Sahn F, Sallam S, Mandil A, Galal O. Anaemia among Egyptian adolescents: prevalence and determinants. *East Mediterr Health J* 2000;6:1017-25.
  23. Shah BK, Gupta P. Anemia in adolescent girls: a preliminary report from semi-urban Nepal. *Indian Pediatr* 2002;39:1126-30.
  24. Al-Sharbati SS, Al-Ward NJ, Al-Timini DJ. Anemia among adolescents. *Saudi Med J* 2003; 24:189-94.
  25. Akramipour R, Rezaei M, Rahimi Z. Prevalence of iron deficiency anemia among adolescent school girls from Kermanshah, Western Iran. *Hematology* 2008;13:352-5.
  26. Mikki N, Abdul-Rahim HF, Stigum H, Holmboe-Ottesen G. Anemia prevalence and associated sociodemographic and dietary factors among Palestinian adolescents in the West Bank. *East Mediterr Health J* 2011;17:208-17.