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Prevalence of Anemia Amongst Adolescent Females in South Western Nepal

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A retrospective hospital based study was carried out in south western Nepal to determine the prevalence of anemia in adolescent females. Cyanmethemoglobin method was used for determination of hemoglobin level. Out of 1888 subjects 793 adolescents were diagnosed as anemic. The prevalence of anemia among adolescent population was 42% and affected with various grades of anemic condition; 59.14% being mildly anemic and 32.02% moderately anemic while 8.82% suffered from severe anemia. Mean and SD of age and hemoglobin was 15.59±2.35 years & 9.85±1.87 gm/dl among anemic population respectively. The mean and SD of age and hemoglobin was 15.39±2.39 years & 12.32±2.41 gm/dl among total population respectively. This study highlights high prevalence of severe anemia among adolescents female. There is an urgent need to develop international programmes in the SWN in the form of nutritional supplementation along with prophylaxis of iron, folic acid tablets for prevention of anemia.

Keyword: Adolescents, Anemia, Females, Prevalence, South Western Region.

1. Introduction

The World Health Organization (WHO) defined adolescents as the population of 10-19 years of age. [1] Out of estimated 27 million populations in Nepal around 23% are adolescents. [2, 3] Adolescent in females has been recognized a special period of transition from girlhood to womanhood. Adolescent girls constitute one fifth of the female population in the world.

Adolescents constitute about 25% of the population and form an important physiological group whose nutritional needs demand special attention [4]. Adolescence is a period of rapid growth, weight gain and blood volume expansion. The over-all iron requirement of the body increases during this period. During adolescent period, the risk of iron deficiency (ID) and anemia among boys and girls appears to be more due to growth spurt and in girls it remains on such during their reproductive life [5]. ID is the most widespread form of malnutrition among women and children. In India anemia affects an estimated 50% of the population [6]. Numerous studies among adolescent girls have shown that the prevalence of anemia ranges from 22.00-96.50% in India[7–12].

Evidence from studies [13,14] showed that adolescents are at an increased risk of developing anemia due to increasing iron demand during puberty, menstrual losses, limited dietary iron intake and faulty dietary habits.

It is reported that 2170 million people are affected worldwide by nutritional anemia. Out of these, 90% live in developing countries. Among these developing countries, South East Asia has the highest prevalence of anemia. [15] The prevalence of iron deficiency anemia (IDA) in developing countries as a whole is 36% where as it is only 8% in developed countries [16]. The prevalence of anemia is high in women of reproductive age, 47% across developing countries, and it worsens to 57% during pregnancy [17]. The prevalence of anemia among

rural Nepalese adolescent of both sex was 42% [18].

The present study was designed to assess the prevalence of anemia and determine hemoglobin (Hb) status among adolescents 10-19 years in females of South Western Nepal (SWN).

2.Materials and Methods

The study used data from the Universal College of Medical Sciences (UCMS), hospital from March 2012- May 2013. Prevalence of adolescent age group (10-19 years) was a unique outcome variable of interest in the study cut-off value to diagnose anemia was Hb level < 12 gm/dl. Further anemia was classified into three degree according to WHO: mild, moderate and severe. Hb cut-off values of anemia were 10-11.9 gm/dl, 7.0-9.9 gm/dl, and < 7.0 gm/dl respectively [19]. WHO guideline was used for interpretation and classification of anemia [20].

2.1Data Collection and Hb estimation

This hospital based study was carried out among adolescents age group (10-19 years) at the UCMS, Bhairahawa, Nepal from March 2012 to May 2013. UCMS is situated at SWN and provides health services to people from different districts of SWN, Nepal and adjoining areas of Uttar Pradesh, India. A total of 1888 outdoor and indoor patients who visited UCMS during the study period for their medical checkup and got their Hb estimated were included in this study. Assessment of Hb concentration was carried out by cyanmethemoglobin method[21]. Age and Hb levels of study patients were collected from the hospital records and analyzed for anemia. The study protocol was duly approved by the ethical committee of the UCMS, Bhairahawa, Nepal.

2.2Statistical analysis

Statistical package for social science (SPSS 17.0) was used for data analysis. Data were presented as mean ± SD. Statistical significance was calculated using Chi-square test and p value < 0.05 was considered significant.

3.Results

Anemia is a condition characterized by a decrease in the concentration of Hb in the blood. Based on concentration of Hb in the blood, anemia was classified into three groups, mild, moderate and severe. The mean and SD of age and Hb were 15.39 ± 2.39 years & 12.32 ± 2.41 gm/dl among total population. Highest anemic was found at the age of 17 years (41.86%) of the anemic population as shown in **Table 1**.

Table 1: Number and percentage of patients in different age groups

Age in years	Total Number of Patients	Normal	Anemic
10	81 (4.29%)	49 (4.48%)	32 (4.03%)
11	58 (3.07%)	45 (4.11%)	13 (1.63%)
12	227 (12.02%)	131 (11.98%)	96 (12.10%)
13	127 (6.72%)	81 (7.41%)	46 (5.80%)
14	82 (4.34%)	51 (4.66%)	31 (3.92%)
15	109 (5.77%)	66 (6.03%)	43 (5.42%)
16	305 (16.15%)	191 (17.47%)	114 (14.37%)
17	715 (37.87%)	383 (35.04%)	332 (41.86%)
18	80 (4.23%)	45 (4.11%)	35 (4.41%)
19	104 (5.50%)	53 (4.84%)	51 (6.43%)
Total	1888	1093 (58%)	793 (42%)

Table 2 Shows that 793 subjects were diagnosed as anemic patients out of total population of 1888 in our study. The total percentage of anemic patients was 42%. The mean and SD of age and Hb in anemic population was 15.59 ± 2.35 years & 9.85 ±1.87 gm/dl respectively.

Table 2: Number and percentage prevalence of anemia

	Non-anemic	**Anemic**
Number of patient	1095 (58%)	793 (42%)
Age (year)	15.25±2.42	15.59±2.35
Hb level (gm/dl)	13.60±1.27	9.85±1.87

Table 3 Shows the prevalence of anemia among adolescents. Status of anemia based on Hb among anemic population was found 42%. Severe anemia was 8.82%, moderate was 32.03% and mild was 59.14%. Hb level was significantly different among these categories (p<0.05).

In our study status of anemia based on Hb levels, severe anemia was 8.82% and highest prevalence was seen in the age of 17 years 41.86% among the anemic population 793 (42%). When we see the association between grades of anemia with attributes, we find that age category is showing significant association with grades of anemia (p<0.05). Univariate analysis shows that 16-19 years age group of adolescents have more chances to have anemia comparison to 10-15 years age group of adolescents.

Table 3: Severity of anemia

	Mild	**Moderate**	**Severe**
Number of patients	469 (59.14%)	254 (32.03%)	70 (8.82%)
Hb level (gm/dl)	11.07±0.55	8.81±0.02	5.38±1.17

4. Discussion

Nutritional anemia is common all over and there are around 1 billion iron deficient people in the world[22]. There are very few studies on the prevalence of anemia among adolescents in comparison to other groups like women and children in the world and it is the case in Nepal too.

A high prevalence of IDA was found among adolescents. IDA more than 20% is regarded as public health problem by WHO. The WHO proposed a scheme for classification of public health severity of anemia[23] and anemia was considered as mild if prevalence is 1-9%, moderate if it is 10-39% or severe problem if it is >40%. According to the present study, showed that anemia of moderate severity among studied adolescents was considered a health problem.

In females, the higher prevalence of anemia observed reflect the adverse effect of lower dietary iron intake with menstrual blood loss, which imposes extra demand for iron. Higher prevalence of anemia now found at the age of 17 years. This is in agreement with many studies reported elsewhere [24, 25].

In a government school some study from middle socioeconomic group of North East Delhi reported a prevalence of anemia is 45% [26]. Similarly studies on prevalence of anemia from different states of rural India, reported a prevalence of anemia from 46-90% [27-29].

Our study is hospital based study in which we included female patients of adolescents' age group (10-19 years) in SWN. The study population comprised of 1888. The prevalence of anemia among adolescents was 42%. Further studies of our anemic subjects which is more than

in a study done in India 2004 showed the prevalence among adolescents 23.9% in females. [30] In the recent study conducted in Morang, district, Nepal, the prevalence of anemia in adolescent age group both sexes i.e. males and females was found 47.7% and 52.3% respectively[31]. Our study further revealed that anemia was mostly recorded at the age of 17 years. In many studies was found to that anemia is a common problem in adolescent age group due to low income they are unable to take dietary food, lack of awareness is also main cause of anemia.

There are many causes of anemia but ID is the predominant nutritional deficiency and is present even when other causes of anemia are recognized. Similarly data from NNMB (National Nutritional Monitoring Bureau, 2008) survey showed that iron and folic acid intake in all age group was very low. It affects one's development growth and resistance to infection and is also associated with mortality among children younger than 2 years old.

In females, adolescence marks the beginning of the menstrual cycle or reproduction. Adolescents gain 30% of their adult weight and more than 20% of their adult height between 10-19 years, which we call as growth spurt [32]. Among women of reproductive age, adolescent girls and pregnant women are at more risk of anemia: adolescents because of the onset of menstruation and pregnant women because of the increased blood volume associated with pregnancy [33].

This article focuses on the etiology of anemia in relation to age and reviews its trend in SWN and adjoining area of India. Anemia was most recorded at the age of 17 years. In a study of adolescent females, prevalence of anemia was found to be 59.8% [34]. In the study of pregnant and lactating women, it was found that 84% pregnant and 92.2% lactating women were anemic with severe anemia is 9.2% and 7.3% respectively [35].

Further research is recommended to identify the specific risk factors for anemia. It may helpful to implement measures to improve nutritional knowledge and awareness among mothers and health workers.

5. Conclusion:

This study highlights a high prevalence of severe anemia among adolescents female age 10-19 year age group of SWN. There is an urgent need to develop international programmes in the SWN in the form of nutritional supplementation along with prophylaxis of iron, folic acid tablets for prevention of anemia. Regular nutritional education session should be carried out to increase awareness in adolescent female regarding anemia. Further studies with more sample size are needed.

6. Acknowledgement:

7. Conflict of Interest:

There is no conflict of interest among the authors in this study.

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