

Prevalence of Anemia and Its Determinants Factors

Moushami Ghimire¹, Madhusudan Ghimire², Subodh Kumar Pandey³

¹ Assistant Professor, Department of Community Medicine, LMC Palpa, Nepal.

² Associate Professor, Department of Community Medicine, LMC Palpa, Nepal.

³ Sr. Consultant, Department of Nephrology, Siddhartha City Hospital, Bhairhawa, Nepal

ABSTRACT

Introduction: Low hemoglobin concentration in blood decrease capacity of the blood to carry oxygen to the body's parts and cannot meet physiologic needs of the body. Symptoms as fatigue, weakness, dizziness and shortness of breath are observed and anemia may notice in body. Anemia is a global public health problem and notably affects population in developing countries. The study was conducted to evaluate the hemoglobin concentration in blood and assess the status of anemia. **Materials and Methods:** Seven hundred thirty one respondents were involved in the cross-sectional study. It was conducted in Lamahi Municipality of Dang district of Nepal during period of October 2018-February 2019. Ethical consideration was maintained before conducting study. SEED HOSPITAL was supported for all safe laboratory procedure to measure hemoglobin concentration in blood. Mean± Standard Deviation, Median, Independent sample F- test (sig. 2-tailed), chi-square test and graph curve were analyzed through SPSS-21 and interpreted the related findings accordingly. **Results:** Study population had the median age of 32 years and mean ± SD values for age 35.04 ± 18.84 years. Female (54.2%) and Choudhary(34.2%) were involved. Median and Mean Hemoglobin concentration in blood (g/dl) found to be 11.5 and 11.52 ±1.89 among the study population respectively and Prevalence of anemia was 80.6%. **Conclusion:** Mean Hemoglobin concentration in blood (g/dl) was significantly lower than the standards of World Health Organization. Most of the respondents were anemic. Age, sex and ethnic differences were observed considerably in hemoglobin concentration in blood.

Key words: Anemia, Hemoglobin Concentration and Lamahi Municipality

INTRODUCTION

Hemoglobin is essential to transport oxygen all over the body and its concentration in blood is reliable indicator to assess anemia. World Health Organization has used the hemoglobin concentration in blood and established some cut-off levels, stratified by gender and age to define the presence of anemia. Anemia is a condition in which the number and size of red blood cells or the hemoglobin concentration falls below an established cut-off value, consequently impairing the capacity of the blood to transport oxygen around the body.[1] Anemia has been defined on the basis of hemoglobin concentration for every specific group as Pregnant women/<5 years (<10.9 g/dl), 5 - 11 years (<11.5 g/dl), 12 – 14 years (<12 g/dl), Female >14 years(<12 g/dl), Male >14 years(<13 g/dl). Generally it is classified in mild, moderate, or severe.[2] It occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children.[3] It has substantial negative effects on the health and economic wellbeing of nation and communities. Children with anemia

experience irrevocable cognitive and developmental delays and exhibit decreased worker productivity as adults.[4] Severe anemia in pregnant women increases maternal morbidity and mortality and involves a high risk for fetus [5, 6], lead to premature delivery and low birth weight baby and contributes to preventable mortality. Anemia is an indicator of poor quality of life as well as nutrition in community. General body weakness, frequent tiredness, and lowered resistance to disease are considered as consequences of anemia in adult population. It occurs commonly worldwide and at all ages of life [7] although frequently overlooked, it affects mortality, morbidity and quality of life, even when mild.[8,9] Anemia is worse in developing countries mainly because of infectious diseases, parasitic infections, and malnutrition [10, 2]. World Health Organization has categorized anemia as a significance problem of public health on the basis of its Prevalence as ≤4.9 (No public health problem), 5.0–19.9 (Mild public health problem), 20.0–39.9 (Moderate public health problem) and ≥40.0 (Severe

public health problem).[11] Anemia is a major public health problem especially in developing countries. Still this fundamental health issue has not been solved but continues to exist affecting the health, quality of life and working capacity in billions of people all over the world.[12] It is affected to both developing and developed countries with major consequences for human health as well as social and economic development.[2]

In past scenario, all most researchers focused their research on specific groups (infant, <5 years children, pregnant female) and some of few researcher included geriatric population. In the situation, to estimate prevalence of anemia in general population in community can be complicated; it is main research gap for the study so researcher has tried to fill this research gap by including the general population to assess the prevalence of anemia and its associated factor.

MATERIALS AND METHODS

Community based cross-sectional study was conducted to analyze hemoglobin concentration in blood for finding anemia prevalence in study population in Lamahi Municipality of Dang district of Nepal. The sample size was calculated and determined seven hundred thirty one (731) on the basis of 5% margin of error at 95% confidence level. The study period was October 2018-February 2019. Ethical consideration was maintained. Researcher assured that the participants should not be subjected to harm in any ways whatsoever, respected the dignity of participants and full consent was obtained from them prior to study. Skilled lab technician was involved to collect blood from the respondents in study area. Laboratory Department of SEED HOSPITAL supported for appropriate lab investigation and followed safe laboratory procedure to measure hemoglobin concentration in blood and recorded related information. Data were analyzed by using SPSS-21. Statistical tools (Mean± Standard Deviation, Median, Independent sample F- test (sig. 2-tailed), Chi-square test and curve in graph were applied to interpret related findings in the study.

RESULTS

Table 1

Demographic profile of the respondents (n=731)

Demographic profile		
Variables		Percent (%)
Age	up to 32 years	51.5
	above 32 years	48.5
	Mean (35.04)/ Median(32.00)/ Std. Deviation(18.84)	
Ethnic group	Choudhary	34.2
	Non -choudhary	65.8
Sex	Male	45.8
	female	54.2
Hemoglobin (g/dl)	up to 11.5	52.7
	above 11.5	47.3
	Mean (11.52)/ Median (11.5)/ Std. Deviation(1.89)	

Average trends of hemoglobin (g/dl) level by age group (n=731)

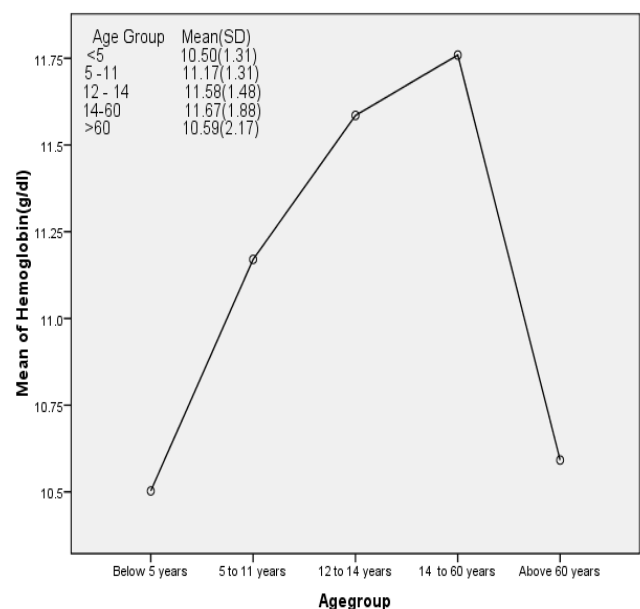


Figure 1

Table 2
Status of anemia (n=731)

Variables	Anemia(Hemoglobin less than 13g/dl)	
Age	Below 5 years	12.7%
	5 to 11 years	12.1%
	12 to 14 years	8.3%
	Above 14 years	33.1%
Sex	Male	42.9%%
	Female	57.1%
Ethnic group	Choudhary	39.6%
	Non -choudhary	60.4%
Prevalence of Anemia (80.6%,N=590)		

Table 3
Hemoglobin concentration in blood with demographic variables (n=731)

variables	Hemoglobin (g/dl)	
	Mean±	Std.Dev.
Age	Both age group	11.52±1.89
	up to 32 years	10.83±1.35
	above 32 years	11.60±1.93
Independent sample F- test(sig. 2-tailed) P=0.000/df=110.121/CID=95 %/ lower (-1.109 upper(-0.419))		
Sex	Both	11.52±1.90
	Male	11.95±2.05
	female	11.13±1.65
Independent sample F- test(sig. 2-tailed) P=0.000/df=664.76/CID=95 %/ lower (0.554) upper(1.096)		
Ethnic group	Both group	11.51±1.89
	Choudhary	11.27±1.96
	Non -choudhary	11.66±1.84
Independent sample F- test(sig. 2-tailed) P=0.008/df=728/CID=95 %/ lower (-0.671) upper(-0.103)		

Table 4
Status of Anemia with demographic variables (n=731)

Variables	Anemia status	
	Anemia	No anemia
Age	up to 32 years	69
	above 32 years	137
	χ^2value=8.443/ P=0.004/df=1/CI=95 %	
Sex	Male	95
	female	47
χ^2value=26.51/ P=0.000/df=1/CI=95 %		
Ethnic group	Choudhary	41
	Non -choudhary	101
	χ^2value=5.330/ P=0.021/df=1/CI=95 %	

DISCUSSION

This study analyzed variation of hemoglobin on the basis of age, sex and ethnic nature and evaluated the prevalence of anemia and their associated factors. Study population had the median age 32 years and mean \pm SD values for age 35.04 \pm 18.84 years. Most of the respondents were female (54.2%) and 34.2% of them were Choudhary(ethnic group).

Hemoglobin concentration in blood (reliable indicator) is used widely to assess anemia in health. In global scenario, mean haemoglobin improved slightly between 1995 and 2011, from 125 g/L (95% credibility interval 123–126) to 126 g/L (124–128) in non-pregnant women, and from 109 g/L (107–111) to 111 g/L (110–113) in children.[13] Low hemoglobin level has a significant impact on health and it is recognized as a major public health problem in community. Mean and median Hemoglobin concentration in blood (g/dl) found to be 11.52 \pm 1.89 and 11.5 among the study population as compared to 13.60 g/dl in pakistan [14], 12.8 \pm 1.8 g/dl in Malaysia.[15] Graphic representation of Hemoglobin concentration in blood among the specific age group of population as below 5 years (10.5 \pm 1.31), 5 to 11 years (11.17 \pm 1.31), 12 to 14 years (11.58 \pm 1.48), 14 to 60 years(11.67 \pm 1.88) and above 60 years(10.59 \pm 2.17) had broad base and narrow tip as compare to similar curve

(lower peak and wider base) was found in south Indian societies of India .[16]

Concentrations of hemoglobin had stat to increase from age group 5- 11 years, reached to peak at age 14 to 60 years and started decline from 60 years. It was found to be low hemoglobin concentration in below 5 years and above 60 years in the study.

Mean Hemoglobin concentration of males (13.04 g/dl) was significantly higher than females value of 11.63 g/dl in Pakistan.[17] An Indian study explained that median haemoglobin concentration was 11.8 g/dL (interquartile range (IQR), 10.2–13.3) 11.3 g/dL (IQR, 9.8–12.4) in females and 12.5 g/dL (IQR, 10.6–14.2) in males in India[18] as compare to male (11.95±2.05) and female (11.13±1.65) in the study.

Hemoglobin levels were 0.9 g/dl lower in blacks than in whites ($P < 0.001$) and 2.0 g/dl lower in females than in males ($P < 0.001$).[19] Blacks had lower mean hemoglobin concentration (12.6 ± 1.5 g/dL) than the whites (13.5 ± 1.5 g/dL).[20] Racial differences have been reported in hemoglobin among the 10 ethnic groups in China at 2014 and the lowest mean hemoglobin concentration was shown in Chuang (126.8 g/L), and the highest mean Hb concentration was in Tibetan (138.5 g/L,[21] Similarly Malaysian ethnic group had Malays 12.8 (±1.8) g/dl, the ethnic Chinese 13.0 (±1.8) g/dl, and the ethnic Indians 12.5 (±1.8) g/dl in Malaysia[17] which was more than the mean hemoglobin concentration of the ethnic choudhary had 11.27±1.96 and it was slightly lower than the ethnic Non –choudhary(11.66±1.84) in the study population. The application of Independent sample F- test (sig. 2-tailed) in the study, the demographic variables (age, sex and ethnic group) had significant impact on hemoglobin concentration in blood of the respondents and its relation was age [$P=0.000/df=110.121/CID=95\%$ / lower (-1.109) upper (-0.419)], sex [$P=0.000/df=664.76/CID=95\%$ / lower(0.554) upper(1.096)] and ethnic groups [$P=0.008/df=728/CID=95\%$ / lower (-0.671) upper(-0.103)].

Globally, anemia is a moderate public health problem and it affects 1.62 billion people (95% CI: 1.50–1.74 billion), which corresponds to 24.8% of the population (95% CI: 22.9–26.7%).[2] Prevalence of anemia decreased from 33% (29–37) to 29% (24–35) in non-

pregnant women, and from 47% (43–51) to 43% (38–47) in children in 1993 to 2005.[2] These prevalences translated to 496 million (409–595 million) non-pregnant women, and 273 million (242–304 million) children with anaemia in 2011. Concentrations of mean haemoglobin were lowest and anaemia prevalence was highest in south Asia and central and west Africa.[13] In case of in preschool-age children, the analysis of worldwide prevalence of anemia from 1993 to 2005, the prevalence was 47.4% and the highest prevalence was in Africa (67.6%), South-East Asia (65.5%), Eastern Mediterranean (46%) and around 20% in the other WHO regions, the Americas, Europe and Western Pacific.[2] In Nepal, Prevalence of anemia decreased from 36.2% and 48.4% in 2006 to 35% and 46.2% in 2011 among the women 15-49 years and under five children respectively. [22] A study report of KP Baral and SR Onta revealed that the overall prevalence of iron deficiency anemia among adolescent population was 65.6% with the distribution of rural 62.4%, urban 70.0%, male 52.3% and female 78.3% in Morang district of Nepal.[23] In the study, total prevalence of anemia (Hemoglobin less than 13g/dl) had 80.6% as compared older people in Malaysia (35.3%)[17], rural north Indian population (47.9%) [24], Malaysian study further explained that highest prevalence of anemia was found among respondents of Indian ethnicity (45.5%) and Malay ethnic groups were more likely to be anaemic in comparison to those of Chinese ethnicity[17] Which was slightly more than choudhary ethnic group (39.60%) in the study. Out of total respondents of the study, 33.10% were anemic in the age group of above 14 years and 57.10% in female as compared to 50% of females were anemic in rural north Indian.[24] Relation of status of anemia with demographic variables as Age (χ^2 value=8.443/ $P=0.004/df=1/CI=95\%$), sex (χ^2 value=26.51/ $P=0.000/df=1/CI=95\%$) and ethnic group (χ^2 value=5.330/ $P=0.021/df=1/CI=95\%$) found to be significant association with the prevalent of anemia in respective group.

CONCLUSION

Low Hemoglobin concentration in blood (g/dl) was found which could be lead to anemia in study area. Most of the respondents were anemic. Age, sex and

ethnic differences were associated considerably with concentration of hemoglobin in blood and prevalence of anemia in study area.

CONFLICT OF INTEREST

Laboratory procedure was supported by SEED HOSPITAL, Lamahi, Dang.

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Corresponding Address

Dr. Moushami Ghimire

Department of Community Medicine, LMC Palpa

Email: madhumds@gmail.com