

Prevalence and demographic distribution of anaemia among those visiting a teaching hospital located in tribal predominant block of Jharkhand: Retrospective record based analysis

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ABSTRACT

Background: Anaemia is a major public health concern in developing countries, with cases increasing rapidly among women, young girls, and children under age 5. **Aims:** This study aimed to estimate the prevalence of anaemia and to identify the age and gender distribution of anaemia among those attending IPD/OPD of a teaching hospital located in the tribal block. **Methodology:** The study was conducted at a multispecialty tertiary care hospital in tribal predominant area, Jharkhand, India. A retrospective, chart-based study design was adopted to achieve the objectives. All inpatient case records available from the Department of Laboratory Medicine and the electronic hospital information system of the institute were reviewed between January 1, 2021, and January 31, 2024. **Result:** A total of 15004 reports were screened for detecting anaemia, of them 7095 (47.3%) were males and 7909 (52.7%) were females. The overall prevalence of any grade of anaemia was found in 6579 (43.8%; 95% CI: 43.1–44.6). Univariate logistic regression analysis to predict status of anaemia among study participants showed the odds of being anaemic was 1.5 times (95% CI: 1.2–2.1) higher among those with age >60 years compared to those who were in the age group of 1–4 years. Females had 2.3 times (95% CI: 2.2–2.5) higher odds of having anaemia than males. **Conclusion:** This study shows that half of the patients attending hospital are anaemic and the burden increases as the age increases and highest among elderly >60 years. The results of our secondary data analysis should contribute to better screening and identifying the cases among people attending the hospital and also could aid planning services at the primary care level.

Keywords: Anaemia, haemoglobin, prevalence

Introduction

World Health Organisation defines anaemia as a heterogeneous condition, with decreased blood concentration of haemoglobin, irrespective of the underlying cause, caused by poor nutrition, infections, chronic diseases, heavy menstruation, pregnancy

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issues and family history. It is often caused by a lack of iron in the blood. It is preventable and treatable and affects 1.76 billion people worldwide.^[1] Developing countries have higher prevalence rates due to their low socioeconomic status and indigent access to healthcare services.^[2] Compared to all other developing nations, India is estimated to have a higher prevalence of anaemia.^[3,4] India ranked 170 out of 180 countries for anaemia among women during the Global Nutrition Survey, 2016.^[5]

India is trying to control the burden of nutritional anaemia since 1973 through the National Nutritional Anaemia Prophylaxis Programme (NNAPP). In spite of several revisions and modifications in NNAPP and until recently Anaemia Mukth Bharath (AMB) to reduce the prevalence of anaemia in children, adolescents, and women in the reproductive age group by three percentage points between 2018 and 2022.^[3,6] Unfortunately, the prevalence is much higher in many states including Jharkhand as per National Family Health Survey (NFHS-5) report. In Jharkhand, the prevalence of anaemia among women of reproductive age group and among adolescent has increased from fourth to fifth rounds of NFHS-5.^[7] Thus making India far away from the attainment of Sustainable Development Goals related to anaemia elimination by 2030.^[8,9] The major contributing factors for such high prevalence in developing countries like India are, increasing, female gender, decrease in socio-economic, residing in rural area, iron deficiency in diet, lack of knowledge about anaemia and its determinants.^[10]

Considering the high burden of nutritional anaemia among vulnerable sections of the community in Jharkhand, it was planned to establish an Anaemia Intervention Centre in the newly established tertiary care teaching institute, at Deoghar, Jharkhand, an Institute of National Importance under the Ministry of Health and Family Welfare. As a preliminary step, we aimed to analyse the laboratory data available at the institute to estimate the burden and to identify the age and gender distribution of anaemia cases visiting the hospital. The results of our secondary data analysis apart from helping us to better screen and identify the cases among people attending hospital, will help in establishing special clinics at primary healthcare centres, resource allocation, and improving the quality of care provided.

Materials and Methods

Study setting and design

The present investigation is a retrospective cross-sectional study in a multispecialty teaching hospital in the Devipur block of Jharkhand's Deoghar district. The institute offers outpatient and inpatient services and distinct lab services with a daily intake of over 300 samples from inpatient and outpatient departments. The institute provides preventative, promotive, curative, rehabilitative, and palliative health care services for the residents of Jharkhand and the surrounding states.

Study population

The laboratory reports of all patients seeking care from the study setting that were maintained in the Department of Laboratory Medicine was included during the study period of 3 years between January 1, 2021 and January 31, 2024. Reports from pregnant and lactating mothers and infants less than 6 months of age were excluded.

Date collection

The study was carried out after obtaining approval from the Institute Ethics Committee (Human Studies). Information related to sociodemographic variables namely age in years, gender and the haemoglobin values in g% was collected without retaining any identifying information from the laboratory report. De-identification was done by a third person who was not involved in analysing the study data. The laboratory that provides service in the study setting is a NABL-accredited laboratory performing nearly 300 to 400 bio-chemical tests per day. Haemoglobin is estimated using the Electrical impedance and flow cytometry method with this Mindray- BC-5150 instrument available at the laboratory.

Statistical analysis

Descriptive statistics, such as frequencies and percentages, were used to summarise the categorical variables and the mean and standard deviation for continuous variables. Associations between categorical demographic variables and severity of anaemia were assessed using the Chi-square test. Pearson correlation was carried out to find the relationship between age and haemoglobin values. Multivariate linear regression was done to predict the haemoglobin values of the participants with age and sex. All tests were two-tailed, and $P < 0.05$ was considered statistically significant. Data were analysed using Statistical Package for Social Sciences (SPSS) 25 software (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago, Illinois, USA: SPSS Inc).

Results

A total of 15004, reports were screened for detecting anaemia, of them 7095 (47.3%) were males and 7909 (52.7%) were females. Most of the study participants belong to the age group of 30-44 years (4324; 28.8%), followed by 45-59 years (3942; 26.3%) [Table 1]. The overall prevalence of any grade of anaemia was found in 6579 (43.8%; 95% CI: 43.1 – 44.6) and 8425 (56.2%) were normal haemoglobin status. Among male 33% and among females 53.6% were having any grade of anaemia.

Among female participants, 3674 (46.5%) had normal haemoglobin, 2140 (27.1) were mildly anaemic, and 1879 (23.8) and 216 (2.7) were moderately and severely anaemic, respectively. Mild anaemia was highest among people whose age is more than 60 years (29.2%) followed by 45-59 years (26.8%) and least among 5-11 years (10.5%). Severe anaemia was maximum among >60 years followed by 30-44 years (2.8%), and among

1-4 years, it was a minimum (1.4%). As age advances, the severity of amenity and overall prevalence significantly increases with age [Table 2].

Univariate logistic regression analysis to predict the status of anaemia among study participants showed the odds of being anaemic was 1.5 times (95% CI: 1.2–2.1) higher among those with age >60 years and for those whose age group was 5-11 years had 50% lesser risk to have anaemia compared to those who were in the age group of 1-4 years. Females had 2.3 times (95% CI: 2.2–2.5) higher odds to have anaemia than males. Multivariate adjusted analysis revealed those who belong to the age group more than 60 years had 1.4 times (95% CI: 1.1–1.9) higher than those who belong to 1-4 years and it was 40% (95% CI of adjusted OR: 0.5-0.9) lesser than 15-29 years of age. Females had 2.4 times (95% CI: 2.3–2.6) higher odds to have anaemia than males after adjusting for age group [Table 3].

The distribution of grades of anaemia across various age groups among males and females is shown in Figures 1 and 2. It revealed

Table 1: Age- and gender-wise distribution of study participants and severity of anaemia (n=15004)

Characteristics	n (%)
Age group in years	
01–04	217 (1.4)
05–11	458 (3.1)
12–14	251 (1.7)
15–29	3254 (21.7)
30–44	4324 (28.8)
45–59	3942 (26.3)
>60	2558 (17.0)
Gender	
Male	7095 (47.3)
Female	7909 (52.7)
Severity of anaemia	
Normal	8425 (56.2)
Mild	3668 (24.4)
Moderate	2541 (16.9)
Severe	370 (2.5)

Prevalence of any form of anaemia 43.8% (95% CI: 43.1–44.6)

Table 2: Association between age and gender with severity of anaemia (n=15004)

Parameters	Severity of Anaemia				P
	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	
Gender					
Male	4751 (67.0)	1528 (21.5)	662 (9.3)	154 (2.2)	<0.001*
Female	3674 (46.5)	2140 (27.1)	1879 (23.8)	216 (2.7)	
Age in years					
01–04	127 (58.5)	47 (21.7)	39 (18.0)	4 (1.4)	<0.001*
05–11	331 (72.3)	48 (10.5)	72 (15.7)	7 (1.5)	
12–14	141 (56.2)	59 (23.5)	41 (16.3)	10 (4.0)	
15–29	2006 (61.6)	678 (20.8)	511 (15.7)	59 (1.8)	
30–44	2461 (56.9)	1033 (23.9)	710 (16.4)	120 (2.8)	
45–59	2157 (54.7)	1057 (26.8)	642 (16.3)	86 (2.2)	
>60	1202 (47.0)	746 (29.2)	526 (20.6)	84 (3.3)	

*Statistically significant (P<0.05)

that in both genders the prevalence of anaemia increases after the group of 12-14 years and then again it increases more than 45 years. In most categories of age, the prevalence was more in females except among those who were more than 60 years.

Discussion

Our study showed that overall prevalence of 43.8% and among females it was 53.6%. Of the total participants, 16.9% and 2.5% had moderate and severe anaemia, respectively, according to WHO criteria. Among females, 27.1%, 23.8% and 2.7% were mild, moderate and severe anaemia. Females and those who were > 60 years old had a higher risk of having anaemia compared to their counterparts. The distribution of grades of anaemia across various age groups among males and females revealed that in both genders the prevalence of anaemia increases after the group of 12-14 years and then again it increases more than 45 years.

In the current study, the prevalence of anaemia among children under age 5 was 41.5%; however, the recent NFHS-5 data showed that the national average was 67%, and for Jharkhand state, it was 67.5%.^[7] The prevalence in the study setting was lesser than both national and state averages. The prevalence of anaemia among adult women and men of age group 15-49 as per NFHS-5 in Jharkhand was 65.3% and 29.6%, respectively; however, in our study, it was 46.1% and 27.5%, respectively. Again, the prevalence was lesser than the state average. Among adolescent females and males of age group 15-19, the prevalence was 65.8% and 39.7% as per NFHS-5 data, and in the current study, it was 54.1% and 19.5%, respectively.^[7] Across age groups in both genders, the prevalence was lesser than the state average. The possible reason could be the data were collected among the hospital patients who were not real representatives of the Jharkhand state.

India’s Comprehensive National Nutrition Survey (CNNS, 2016–2018) conducted at the national and regional level showed that anaemia was present in 40% of girls and 18% of boys, but in our study, it was higher than the prevalence of that study.^[11] The prevalence in the current study was slightly higher than the study done by Malhotra *et al.*^[12] in North India in which the overall prevalence of anaemia was 47.9% being

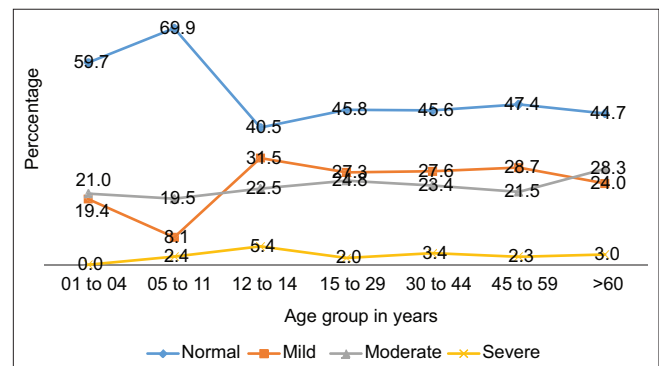


Figure 1: Age-wise distribution of severity of anaemia among female participants

Table 3: Predictors of any grade of anaemia using bivariate and multivariate binary logistic regression (n=15004)

Parameters	Anaemia status n (% [^])		Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)	P
	Normal (n=100)	Anaemia (n=71)				
Age category in years						
01-04	127 (58.6)	90 (41.5)	Reference	---	Reference	---
05-11	331 (72.3)	127 (27.7)	0.5 (0.3-0.8)	<0.001*	0.5 (0.3-0.8)	<0.001*
12-14	141 (56.2)	1246 (38.4)	1.1 (0.8-1.6)	0.67	0.9 (0.6-1.4)	0.80
15-29	2006 (61.6)	1248 (38.4)	0.9 (0.7-1.2)	0.36	0.6 (0.5-0.9)	0.009*
30-44	2461 (56.9)	1863 (43.1)	1.1 (0.9-1.4)	0.64	0.7 (0.5-1)	0.10
45-59	2157 (54.7)	1785 (45.3)	1.1 (0.9-1.5)	0.27	0.9 (0.6-1.2)	0.53
>60	1202 (47.0)	1356 (53.0)	1.5 (1.2-2.1)	0.001*	1.4 (1.1-1.9)	0.01*
Gender						
Male	4751 (67)	2344 (33)	Reference	---	Reference	---
Female	3674 (46.5)	4235 (53.5)	2.3 (2.2-2.5)	<0.001*	2.4 (2.3-2.6)	<0.001*

Note: [^]Row percentage, OR=Odds Ratio, CI=Confidence Interval, *statistically significant (P<0.05)

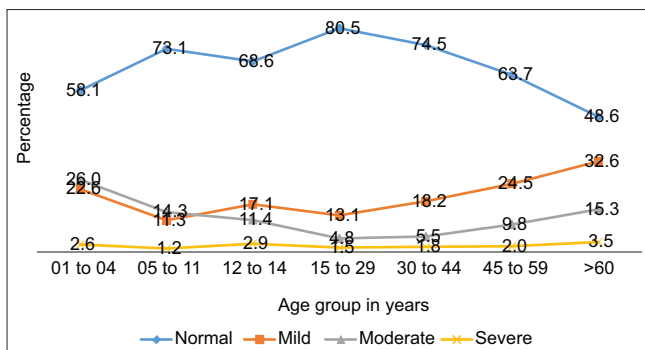


Figure 2: Age-wise distribution of severity of anaemia among male participants

50% among females and 44.3% among males. A study was done by Nanjunda^[13] in South Karnataka showed that 62% of children under age 5 were anaemic, which is also higher than the present study. A previous study conducted in Bihar and Uttar Pradesh showed that overall anaemia was more prevalent among adolescent girls than adolescent boys (20% vs. 8.7%), and in the current study, anaemia was more among girls than boys; however, the burden was higher than their study.^[14] A hospital-based study done in Uttarakhand revealed that the overall anaemia was seen among 53.2% of participants, which was slightly higher than the current study and the prevalence among females was higher than males and it was similar to the current study.^[14]

A clinic-based study done in an Indian rural setting showed that children under age 5 had the highest prevalence of anaemia, especially in children aged 1-2 years, and the gender differences are more in females and are only seen after the menarche period and the prevalence increased with age.^[15] These findings were in alignment with the current study findings. A study by Kaustubh Bora on the trends of severe anaemia in India using Health Management Information System datasets revealed that severe anaemia occurred in 3.29% of the population, and in the current study, it was 2.5% lesser than the national average data.^[16]

The major strength of this study is that the larger sample of 15,000 patient details was included, and hence, the research

findings could directly inform the clinical practice and policy within the study setting, thereby facilitating the rapid translation of research findings into improved patient care and health outcomes. The laboratory test reports were prepared by the NABL-accredited laboratory of the institute, thus minimising the information bias. It helps to develop and implement anaemia-related interventions based on the study findings. As it is hospital-based, there is potential for follow-up of the patients making it possible to track the trend, progression, and intervention outcomes that will be delivered in future. Being retrospective in nature, the major limitation of the study is the non-availability of data on potential confounding variables included in the records.

Conclusion and Recommendation

This study shows that half of the patients attending the hospital are anaemic, and the burden increases as the age increases and is highest among the elderly (patients >60 years). Females were more anaemic than males, and the prevalence of moderate and severe anaemia was also high among females. So, it is clearly seen that despite the progress made for anaemia reduction in the last decade, especially in children and women, anaemia continues to be a significant public health concern in Jharkhand. This finding allows us to go for an early anaemia screening and intervention centre not only in the tertiary care setting but also in the primary care level. A comprehensive intervention package targeting improvement in health literacy, health-seeking behaviour, and socio-cultural determinants and empowering vulnerable sections of society is required to attain the SDG goal target on anaemia.

Ethical

The Institutional Ethics Committee of, All India Institute of Medical Science (AIIMS), Deoghar, India, approved this study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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