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# Anemia Among Healthcare Workers: A Hidden Health Challenge in Tertiary Hospitals

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**Abstract:** ***Background: The objective of the present paper was to assess the prevalence of anemia among employees in a tertiary care hospital through an annual health checkup conducted for all the employees. This paper also assessed correlations existing between the prevalence of anemia and socio-demographic variables (age,job,gender), if any. Methods: This study is a cross-sectional analysis carried out at a tertiary care hospital. It analyzes the annual health check up of 1604 healthcare workers. The health checkup included a hemogram via which, anemia was detected and the appropriate treatment and follow-up was prescribed. Results: Among the 1745 hospital employees included in the study, 450 (25.8%) were found to be suffering from anemia. Conclusion: A substantial number of healthcare employees in the study were found to be anemic, highlighting anemia as a major health issue among hospital staff. As a result, it is essential to take measures to lower the prevalence of anemia by promoting early detection through regular health screenings and initiating treatment promptly.***

**Keywords:** Anaemia, prevalence, cross-sectional study, healthcare workers, job profile

## 1. Introduction

Anemia is the most widespread nutritional deficiency disease globally and continues to be a significant concern, despite being easily diagnosable and treatable.[1] Anemia is characterized by a hemoglobin level lower than 12 gm% in non-pregnant females, below 13gm% in males and below 11 gm% in pregnant females and children under 5 years of age.[2] The most common type of anemia prevalent in hospital employees was also iron deficiency anemia. This condition is often caused by insufficient iron intake in the diet, chronic blood loss, or a combination of both factors. [3,4] Other causes of anemia include poor nutrition, infections, chronic diseases, increased blood loss during menstruation, pregnancy issues and a family history of the condition.[5]

Common symptoms of anemia include fatigue, shortness of breath, and a general lack of energy and focus.[6] Anemia prevalence differs based on factors such as age, gender, race, ethnicity, and socio-economic status.[7,8] The National Family Health Survey 5 (NFHS-5) reports that anemia impacts a large segment of India's population, affecting 67.1% of children aged 6–59 months, 57.2% of non-pregnant women aged 15–49 years, 52.2% of pregnant women in the same age group, 57% of all women aged 15–49 years, 22.7% of men aged 15–49 years, 54% of adolescent girls, and 29% of adolescent boys.[1]

Depending on the cause of anemia, immediate nutritional supplementation of iron, B12, and folate is essential. Generally, nutritional deficiencies can be effectively managed and have a positive prognosis when addressed promptly and thoroughly. When anemia is caused by gastrointestinal bleeding or trauma-related bleeding, early identification and treatment can lead to a positive prognosis.[9] Hence, it is crucial to determine the underlying cause of anemia and initiate the correct treatment.

## 2. Aims and Objectives

The aims and objectives of this research paper is as follows:

- To calculate the prevalence of anemia in healthcare workers
- To examine the association between job roles in the hospital (such as doctors, nursing staff, clerks, and security personnel) and the severity of anemia

## 3. Materials and Methods

1) Study type: Cross-sectional retrospective
2) Inclusion criteria: All the employees [Teaching staff & Non-teaching staff (Technicians, Nursing, Administrative, Support, Security staff)] of either sex who will give consent to enroll in annual health check-up.

3) Exclusion criteria: Employees who will not willing to participate in the study will be excluded.
4) Study Plan: Employees will undergo an annual health checkup wherein their hemoglobin will be measured and documented. Based on their hemoglobin levels, the number of employees with anemia will be estimated. The correlation between prevalence of anemia and the age, gender and job role of the hospital employees will also be studied.
5) Statistical analysis: Data was collected on pre-validated case sheets initially then transformed into MS-Excel spreadsheets. Data was analyzed using openEpi software and the chi-square test.

## 4. Results

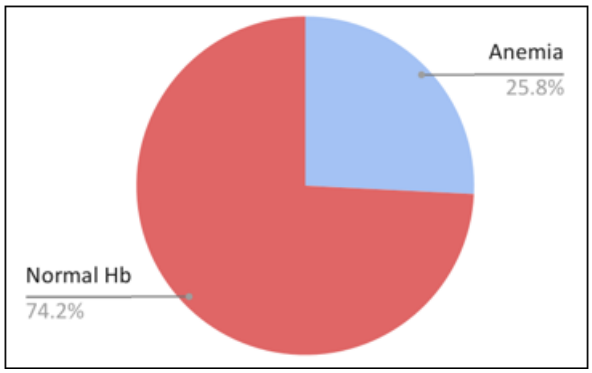
1745 healthcare workers underwent the annual health checkup and they were divided according to their gender, age and job profile as depicted in table 1.

**Table 1**

| Gender | No. of Employees |
|---|---|
| Male | 681 |
| Female | 1064 |
| Age Group (in years) | No. of Employees |
| Below 40 years | 1039 |
| Above 40 years | 706 |
| Job Profile | No. of Employees |
| Staff Nurse | 551 |
| Doctor | 269 |
| MPW | 489 |
| Clerk | 330 |
| Pharmacist | 34 |
| Security | 72 |

In our study, employees having a hemoglobin concentration less than 13gm% for males and less than 12gm% for females were taken to be anemic.[2]

Out of 1604 employees, 450 (25.8%) were found to be suffering from anemia, as depicted in pie chart 1.




**Pie Chart 1**

According to our findings, as shown in Table 1, anemia was observed in 6.6% of male and 38.06% of female healthcare workers. In comparison, the National Family Health Survey 5 (2019-21) reported anemia prevalence rates of 25.0% in men and 57.0% in women aged 15-49 years within the general population.[10] These results indicate that anemia is less prevalent among healthcare workers compared to the general population.

We also examined the association between anemia and gender, as presented in Table 2. A chi-square test revealed a statistic of 214.6883 with a p-value of < 0.00001, indicating that the result is statistically significant ($p < 0.05$). This suggests that anemia is significantly more prevalent among female healthcare workers compared to their male counterparts.

**Table 2**

| Gender | No. of Anemic Employees | No. of Employees with Normal HB |
|---|---|---|
| Male | 45 (6.6%) | 636 |
| Female | 405 (38.06%) | 659 |

In the table 3 given below, we study the association between anemia and the age group. The chi-square test with Yates correction was conducted to examine the association between age group and hemoglobin status among employees. The results are as follows: Chi-square statistic = 6.2577, p-value = 0.012366. At a significance level of 0.05, the p-value is less than 0.05, indicating that the result is statistically significant. Therefore, we reject the null hypothesis and conclude that there is a significant association between age group and hemoglobin status.

**Table 3**

| Age Group (in years) | No. of Anemic Employees | No. of Employees with Normal HB |
|---|---|---|
| Below 40 years | 245 | 794 |
| Above 40 years | 205 | 501 |

Table 4 given below depicts the number of anemic employees and the specific job they perform in the hospital. A chi-square test of independence was conducted to examine the association between job profile and anemia status among employees. The analysis included six job categories: Staff Nurse, Doctor, MPW, Clerk, Pharmacist, and Security. The chi-square statistic was found to be 79.84 with 5 degrees of freedom, and the p-value was <0.00001, which is significantly lower than the standard significance level of 0.05. Consequently, the null hypothesis, which states that there is no association between job profile and anemia status, was rejected. This indicates a statistically significant relationship between the two variables. Among the employees, anemia was most prevalent among Staff Nurses, followed by MPWs, Clerks, Doctors, Security personnel, and least among Pharmacists. These findings suggest that certain occupational factors may contribute to the prevalence of anemia.

**Table 4**

| Job Profile | No. of Anemic Employees | No. of Employees with Normal HB |
|---|---|---|
| Staff Nurse | 203 | 348 |
| Doctor | 26 | 243 |
| MPW | 154 | 335 |
| CLERK | 74 | 256 |
| Pharmacist | 11 | 23 |
| Security | 12 | 60 |

## 5. Discussion

In accordance with the World Health Organization (WHO) guidelines, our study considered employees as anemic if their

hemoglobin levels were below 13 gm% for males and below 12 gm% for non-pregnant females.[2] None of the female employees were pregnant. Out of the 1,745 hospital employees that underwent the annual health checkup, 25.8% were found to be suffering from anemia, with 6.6% males and 38.06% females suffering from it. However, the National Family Health Survey 5 (2019-21) reported anemia prevalence rates of 25.0% in men and 57.0% in women aged 15-49 years in the general population. This suggests that anemia is less prevalent among healthcare workers compared to the general population. This is in accordance with a study that also stated that the prevalence of anemia was lesser among healthcare professionals as compared to the general population.[8] A similar study conducted among medical students in Chhattisgarh also had the same results as our paper.[11] The lesser prevalence of anemia among hospital employees could be due to increased awareness of their health status, regular access to blood tests, and a greater emphasis on nutrition enabling early detection and management of iron deficiency.

Anemia is widely recognized as being more prevalent among females than males, a fact supported by the World Health Organization (WHO).[12] This trend is also observed in studies conducted in low- and middle-income countries [13] and is consistent with findings from research carried out in rural India.[14] In our study, the average hemoglobin concentration was notably higher in males compared to females, and the prevalence of anemia was significantly greater among females. This is particularly concerning for women of childbearing age, as anemia is linked to 12.8% of maternal mortality in Asia.[15] Medical professionals, especially females, are at high risk of developing anemia due to night shifts, irregular dietary habits, and increased consumption of unhealthy foods resulting from long and erratic working hours. Additionally, menstrual blood loss, childbirth, avoiding calories for weight loss and lesser intake of iron-rich food further contribute to the heightened risk of anemia among females. [16,17]

The occurrence of anemia also differed according to the age group among the hospital employees. The prevalence was higher in the older people (above 40 years of age). This finding is in concurrence with other studies which state that the elderly are more susceptible to develop anemia because of age-related changes in bone marrow and gastrointestinal function, along with reduced nutrient absorption and metabolic alterations, can lead to malnutrition, decreased synthesis of hematopoietic blood cells, and a subsequent decline in hemoglobin levels, contributing to anemia. [18,19]

In our hospital employees, we found that the prevalence of anemia also differed according to the various job roles of hospital staff. Among the employees, anemia was most prevalent among Staff Nurses, followed by MPWs, Clerks, Doctors, and Security personnel, with the lowest prevalence observed among Pharmacists. Another research study conducted in Turkey as well as in India have also found a high prevalence of anemia in nurses.[20,21]
Nutritional deficiencies that result in anemia could have serious consequences for the health of future doctors and healthcare providers in India. Considering the current doctor-patient ratio of 1:1700, this issue becomes increasingly urgent.[22] If the staff are fatigued due to anemia, it will affect their productivity at work significantly.[23] Anemia adversely affects job performance, leading to reduced productivity and effectiveness at work. Iron supplementation has been proven to enhance productivity. These results emphasize the need to address anemia as both a health issue and a strategy for boosting workforce efficiency.[24] Treatment for anemia depends on the underlying cause and may include oral iron supplements or Vitamin B12 tablets, intravenous iron therapy, blood transfusions, or, in severe cases, a bone marrow transplant.[25]

Therefore, targeted health interventions and workplace health programs are recommended, particularly for job roles at higher risk. Although this analysis highlights a significant association with age, gender and job profile within the hospital, it does not imply causality. Further research is recommended to investigate underlying factors, such as workload, dietary habits, and other potential confounding variables, to develop effective preventive strategies.

## 6. Conclusion

Our study highlights a significant burden of anemia among hospital employees, particularly among the female staff employees, older employees, and among nurses. While the prevalence of anemia among healthcare workers is lower than in the general population, it remains a critical health concern that can impact workplace productivity and overall well-being. The findings emphasize the need for targeted interventions, including regular mandatory health checkups, dietary modifications, and iron supplementation programs, to mitigate the risk of anemia. Future research should explore the underlying occupational and lifestyle factors contributing to anemia to develop more effective prevention and management strategies.

**Conflicts of Interest**
The authors declare that they have no conflict of interest regarding the publication of this paper.

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