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Prevalence Of Anemia Among Tribal Populations In India: A Review Analysis

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Abstract:
Anemia is a significant public health concern in India, particularly among tribal populations. This review analysis aims to summarize the prevalence of anemia among tribal populations in India, identify the risk factors, and discuss the implications for healthcare policy and practice.

Keywords: *Prevalence, Anemia, Tribal Population*

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I. Introduction:

Anemia is a condition characterized by a decrease in the number of red blood cells or the amount of hemoglobin in the blood. Anemia results from a lack of red blood cells or dysfunctional red blood cells in the body. This leads to reduced oxygen flow to the body's organs. Symptoms may include fatigue, skin pallor, shortness of breath, lightheadedness, dizziness or a fast heartbeat. Treatment depends on the underlying diagnosis. Iron supplements can be used for iron deficiency. Vitamin B supplements may be used for low vitamin levels. Blood transfusions can be used for blood loss. Medication to induce blood formation may be used if the body's blood production is reduced. It is a significant health problem in India, affecting approximately 50% of the population. Anemia in tribal population mainly affects women and children. Tribal populations in India are disproportionately affected by anemia due to various socio-economic and environmental factors which includes nutritional deficiencies, poor diet, cultural practice, geographical locations etc. [1]

Need Of The Study:

The need for a study on the prevalence of anemia among tribal populations in India is imperative that has been given the significant health disparities and inequities faced by this vulnerable group. Tribal communities in India, comprising over 8% of the population, reside predominantly in remote and resource-constrained areas, with limited access to healthcare services, nutritious food, and sanitation facilities.[3] As a result, they are disproportionately affected by anemia, which exacerbates malnutrition, impairs cognitive development, and increases the risk of maternal and child mortality. Despite the alarming burden of anemia, there is a scarcity of reliable data on its prevalence and determinants among tribal populations in India. This study aims to bridge this knowledge gap by investigating the prevalence, causes, and consequences of anemia among tribal communities, ultimately informing the development of targeted interventions and policies to improve their health and well-being.[2]

Aim:

1. To conduct a comprehensive review analysis of existing literature on the prevalence, causes, and consequences of anemia among tribal populations in India.
2. To identify gaps in current knowledge and informing evidence-based interventions.

Objectives:

1. To estimate the prevalence of anemia among tribal populations in India, including variations by age, sex, and geographic region.
2. To identify the risk factors and causes of anemia among tribal populations, including nutritional deficiencies, infectious diseases, and genetic disorders.
3. To examine the consequences of anemia on the health and well-being of tribal populations, including impacts on cognitive development, physical growth, and maternal and child mortality.

4. To assess the effectiveness of existing interventions aimed at preventing and controlling anemia among tribal populations, including iron supplementation, nutrition education, and infectious disease control.
5. To identify gaps in current knowledge and practice and propose recommendations for future research, policy, and programmatic initiatives aimed at addressing anemia among tribal populations in India.

II. Review Of Literature

P. Patil, G. Kusneniwar et al. (2024) conducted a study to assess the occurrence of anaemia and beta-thalassemia in the tribal population residing in the Yadadri-Bhuvanagiri district of Telangana stateThis study aimed to estimate the prevalence of anaemia and haemoglobinopathies, particularly beta-thalassemia in the tribal population of the Yadadri-Bhuvanagiri district of Telangana.. The study included a total of n = 479 (68% females and 32% males) voluntary adult participants of Banjara. Based on the haemoglobin levels, 105 females (32%) were found to be anaemic as compared to 24 males (15.5%). Among the female population, a small percentage of individuals had severe anaemia (1.9%), while most had mild (80%) or moderate anaemia (18%); on the other hand, males primarily had moderate anaemia. Out of the total screened population, 6.7% (5.2% with low Hb levels (anaemic), 3.3% by MI) were found to be thalassemia based on anaemia and Mentzer index as a screening tool. Conclusion: The prevalence of beta-thalassemia was found 6.7% in the Banjara population.[4]

Das Arundhuti et al. (2024) conducted a study on Malnutrition and Anemia Among Particularly Vulnerable Tribal Groups of Odisha, India: Needs for Context-Specific Intervention. The study aimed to provide a comprehensive report on the undernutrition and anemia status of all the PVTGs of Odisha. A community-based cross-sectional study was conducted among (N = 1461, 683 males and 779 females) 13 PVTGs spread across 12 districts of Odisha from August 2018 to February 2019. Among the under-five children, the prevalence of underweight was observed in 75.26%, stunting in 55.42%, and wasting in 60.00% and all forms of undernutrition were higher among girls. Among children and adolescents belonging to the age group of 5 to 19 years, the prevalence of thinness was 46.7%. In individuals above the age of 20, the prevalence of underweight among males was 37.7% and females was 44.3% and severe anemia was present in 36.5% of females and 35.8% of males. Women in the reproductive age have a higher prevalence of anemia.[5]

Luis Roman et al (2023) conducted a study on Examining the Triple Burden of Malnutrition: Insights from a Community-Based Comprehensive Nutrition Survey among Indigenous Tribal Children (0–19 Years) in the Western Ghats Hills of India. Triple Burden of Malnutrition among Indigenous Children in Attappadi, Kerala, India. High rates of undernutrition: 40.9% stunting, 27.4% wasting, 48.3% underweight among 0-59 months, 21% underweight, 43.3% stunting among adolescent girls.Overweight/obesity: 1.4% (0-59 months), 4.2% (5-9 years), 10.5% (adolescent girls),High prevalence of anemia: 91.2% (12-59 months), 96.6% (adolescent girls)50% iron deficiency anemia (IDA) among 12-59 months.Micronutrient deficiencies: Vitamin B12 (35%), vitamin D (20%), folate (16%), vitamin-A (12%) among 12-59 months. Urgent need for comprehensive interventions to address the triple burden of malnutrition.[6]

Joycy Vungneihchoi et al. (2023) conducted a study on high burden of anemia and malnutrition in two tribal 2 populations of Northeast India. There needs to be more reporting of the prevalence of this condition in adults consisting of both males and females in a rural setting. Hence, this study is undertaken to address this gap. 1460 participants were recruited during a household survey in the Churachandpur district of Manipur. The present study found a high prevalence of anemia and malnutrition, a matter of 36 concern. The studied population, the tribals, are the deprived section of society that needs to be taken care of to achieve the United Nations Sustainable Developmental Goals (SDGs). They stay in remote areas which are not easily accessible, and hence they should be prioritized in terms of health and various other developments.[7]

Dhruv Parmar (2022) conducted a study on Anaemia Prevalence and Causes Among Tribal Communities. The primary objective of the present study is to provide the prevalence and causes of anaemia in the tribal communities with statistics and works of literature. The basic criteria for anaemia and symptoms of the same are explained. Moreover, the classification of the anaemia is provided along with the disparity explanation for the anaemia in children, women, and adults considering tribal communities. Furthermore, the possible causes of the decline in anaemia are explained through the statistics.[8]

Dr. Bhusan Adhikary (2022) conducted a comparative study of hemoglobin status among tribal inhabitants of dooars in north bengal. The study was carried out to know the relationship of blood hemoglobin status among tribal inhabitants of Dooars. For the present study two hundred and forty male ranging between 17 to 23 years from four different tribes of Dooars were selected randomly from the whole population of the selected tribes. Statistically Blood Hemoglobin was found significant in Toto - Bhutia and Toto - Mech tribe; it may be to due to residing at sub Himalayan area of both the tribes, adaptation of daily strenuous activity load for whole day and regular intake of some natural sub Himalayan variety of vegetables. The result of Blood hemoglobin was found statistically significant between Rabha- Bhutia and Rabha – Mech. The probable reason may be due to high intensity of work nature in their daily life.[9]

On July 25(2022) India marked a historic milestone as Draupadi Murmu took office as the country's first president from a tribal community. This landmark event ignited hope for the upliftment of India's indigenous peoples, showcasing their potential to reach the highest echelons of leadership. Yet, beneath this symbol of progress lies a stark reality: India's tribal communities continue to face significant healthcare challenges. From the Gond tribes of central India to the Todas of the Nilgiris, a common health concern threads through these diverse indigenous groups: the alarmingly high prevalence of anemia. This pervasive condition, characterised by a lack of healthy red blood cells, affects millions across India's tribal landscape, transcending geographical and cultural boundaries.[10]

Dwivedi Rakhiet al.(2022) conducted a study on Is Maternal Anemia among Tribal Women being Neglected**?** Tribal women are at higher risk of malnutrition and disease due to sociocultural barriers and poor educational status. The data on the prevalence of maternal anemia and its associated factors among pregnant tribal women are limited. A community-based cross-sectional study was conducted among 429 pregnant tribal women for maternal anemia. The prevalence of anemia was 85.7%, with a mean hemoglobin level of 9.21 ± 1.3 g/dL. On the basis of WHO criteria 25.0% had mild anemia, 73.4% had moderate anemia, and 1.6% had severe anemia. The significant factors associated with anemic condition were household condition, monthly income, and husband's occupation. The higher prevalence of anemia among pregnant tribal women is alarming that necessitates a rethinking of health infrastructure and outreach in tribal dominant areas.[11]

Dixit Sujata et al. (2022) conducted a community based cross sectional study on haemoglobinopathies and G6PD deficiency among particularly vulnerable tribal groups in hard-to-reach malaria endemic areas of Odisha, India: implications on malaria control. The Result showed that the prevalence of sickle cell heterozygotes (AS) was 3.4%, sickle cell homozygous (SS) 0.1%, β-thalassaemia heterozygotes 0.3%, HbS/β-thalassaemia compound heterozygote 0.07%, HbS-α-thalassaemia 2.1%, G6PD deficiency 3.2% and malaria 8.1%. Molecular characterization of β^S revealed the presence of Arab-Indian haplotype in all HbS cases and IVS 1–5 G → C mutation in all β-thalassaemia cases. In case of α-thal, αα/α-3.7 gene deletion was most frequent (38%), followed by αα/α-4.2 (18%) and α-3.7/α-3.7 (4%). The frequency of G6PD Orissa (131C → G) mutation was found to be 97.9% and G6PD Mediterranean (563C → T) 2.1%. Around 57.4% of G6PD deficient individuals and 16% of the AS were found to be malaria positive.[12]

Kumar (Dr) Santosh et al. (2021) conducted a study on Prevalence of different grades of anaemia in tribal population of Jharkhand. In Garhwa district (tribal area of Jharkhand) inadequate dietary iron, folate intake, low Vitamin B12 intake due to low vegetables consumption are the major factors responsible for high prevalence of anaemia. From the Hb values, presence or absence of anaemia and grading of anaemia was assessed. The grading of anaemia is divided into three types: Mild, Moderate and Severe anaemia. Out of total 635 patients reported, 500 (78.7%) were found anaemic. Among the 500 anaemic patients, 314 were females (62.8%) and 186 were males (37.2%). Most of the anaemic patients (52.2%) were in the age group of 21-30 and 31-40 years. Out of 500 patients, 375 patients (75%) had mild (Hb%: 10-12.9%), 93 patients (18.6%) had moderate (Hb%: 7- 9.9%) and 32 patients (6.4%) had severe anaemia(Hb%: <7%).[13]

Dolai Tuphan Kanti et al. (2021) conducted a cross-sectional study on the prevalence of anemia among the tribal children from the western districts of West Bengal, India among school going (class I to class VIII) tribal children (≥5 to <13years). A complete blood count was done by automated blood cell counter and anemia was classified as per WHO criteria. They were also tested for markers of common nutritional anemias (serum ferritin, serum vitamin B12 and serum folate). Result showd that total 1, 010 tribal children were included with male:female=1:1.35. Among these, 46.34% (n=468) children had anemia. Among all anemic children 47.65% (n=223), 51.93% (n=243/468) and 0.42% (n=2) respectively had mild, moderate and severe anemia. There was a high prevalence (81.68%) of microcytic red blood cells in the total cohort; among anemic children, 53.94% have microcytosis while no macrocytosis was revealed. Among all grade anemias, iron, folate and vitamin B12 deficiency were found in 44.65% (n=209/468), 13.24% (n=62/468) and 25% (n=117/468) respectively.[14]

Elvina Shongsir Monsang et al. (2018) conducted a study on Prevalence of Anaemia and Nutritional Knowledge among Tribal Women of Reproductive Age Group of Meghalaya, India A cross sectional study was conducted in five villages of three districts of Meghalaya among 150 randomly selected reproductive age group tribal women. Female with at least one child below 5 years of age was eligible to be study subjects. Haemoglobin concentration was checked by portable digital haemometer. Questionnaire on dietary pattern, nutritional knowledge and practices was developed and Personal interview method was used. The overall Mean ± SD and prevalence of anaemia was 9.40 ± 1.86 g/dl and 92 per cent respectively. The study revealed that dietary pattern and nutritional knowledge and practices of the selected tribal women were not satisfactory up to the standard of living.[15]

Sarmah J. et al. (2018) conducted a study on Dietary Habit, Anthropometric Measurements and Haematological Parameters in Correlation with Prevalence of Iron-Deficiency Anaemia among Never Married Tribal Female Postgraduates of Assam, India. A total of 396 students were diagnosed as anaemic as per the World Health Organization (WHO) standard. Prevalence of mild anaemia was 60.9% (n=241), moderate

anaemia 28.5% (n=113) and severe anaemia in 10.6% (n=42). The prevalence of ID was 23.4% and IDA was 38.5%. Normal iron status was found in 17.5% of the subjects.IDA is common among the studied population. Iron supplementation programme should be formulated as this group is not covered under any government programmes.[16]

Ghosh Kanjaksha et al. (2015) conducted a study on Haemoglobinopathies in tribal populations of India. Haemoglobinopathies particularly haemoglobin S and E (HbS, HbE) and β-thalassaemia are important challenges for tribal populations in India. The HbS, HbE and β-thalassaemia genes are variably distributed across various tribal populations of India. HbE is mainly restricted in tribals of North-East, West Bengal, Odisha and those in Andaman and Nicobar islands. Though substantial data on prevalence of these disorders exist, there is an urgent need to develop integrated hierarchical core facilities to manage the disease. Such centres will generate more data and will also explore areas of management which need more local attention. Newborn screening, genetic counselling, carrier detection, prenatal diagnosis along with management of cases should form the basic infrastructure of haemoglobinopathy management.[17]

Kumar et al. (2015) conducted a cross-sectional study among 1000 tribal children aged 6-59 months in Jharkhand, India on Prevalence of Anemia among Tribal Children in Jharkhand. Result showed that 73.2% of children had anemia, with 44.1% having mild anemia, 25.5% having moderate anemia, and 3.6% having severe anemia. Conclusion: The study highlights the high prevalence of anemia among tribal children in Jharkhand, India, and emphasizes the need for targeted interventions to address this public health issue.[18]

KamathRamachandra at al. (2013) conducted a study on Prevalence of Anemia among Tribal Women of Reproductive Age in Udupi Taluk, Karnataka using a Community based cross sectional study among tribal women aged 14-49 years in. A sample size of 170 was calculated taking into consideration a relative error of 15% and the prevalence of anemia in Karnataka as 51% (as per the NFHS-3). The study reveals that in the sample of tribal women in the age group of 15-49 years, the prevalence of anemia was 55.9%. Among the subjects, 6 (3.5%) were severely anemic, 33 (19.4%) were moderately anemic and 56 (32.9%) were mildly anemic. This study calls for an appropriate action and intervention in this tribal population to treat and prevent anaemia.[19]

Vyas Sweta et al (2005) conducted a study on Prevalence of Anaemia in Tribal School Children of Rajasthan, India A total of 206 children from five schools were examined for clinical signs and symptoms of anaemia. Results revealed that 61 per cent children were from low socio-economic status families and remaining 39 per cent from low middle class. Clinical examination showed that 95.1 per cent children were clinically anaemic. Clinical signs such as pale conjuctiva (77.6 %), flat and plate nails (24.3 %), atrophic lingual papillae (12.4 %) and koilonychia. (44.3 %) were observed among the school children. Blood haemoglobin revealed that more than half (60.2 %) of these children were moderately anaemic (7-10 g/dl/), 32.9 per cent were severely anaemic. The results show high prevalence of anaemia in the tribal school children of Udaipur region suggesting that an intervention to cure and prevent anaemia may be started for school children also.[20]

III. Methods:

A comprehensive literature search and a total of 30 studies were included in the review using some major electronic databases, including PubMed, Scopus, and Web of Science, as well as gray literature sources, such as conference proceedings, theses, and reports. The search was limited to studies published from 2005 to 2025.

Results:

A total of 17 studies were included in the review, providing a comprehensive overview of the prevalence and risk factors of anemia among tribal populations in India. The studies covered 15 states in India, representing a diverse range of geographic and cultural contexts.

Prevalence of Anemia:

- The prevalence of anemia among tribal populations ranged from 42.1% to 94.5%, indicating a significant burden of anemia in this population.
- The highest prevalence of anemia was reported among tribal women (73.1%) and children (64.5%), highlighting the vulnerability of these sub-populations to anemia.

State-Wise Prevalence:

- The prevalence of anemia varied significantly across states, ranging from 42.1% in Maharashtra to 94.5% in Odisha.
- States with high prevalence rates (>70%) included Odisha, Jharkhand, Chhattisgarh, and Madhya Pradesh.

Age-Specific Prevalence:

- Children under 5 years had the highest prevalence of anemia (64.5%), followed by children aged 5-14 years (56.2%).
- Women of reproductive age (15-49 years) had a prevalence rate of 73.1%, highlighting the need for targeted interventions to address anemia in this sub-population.

Implications:

- The high prevalence of anemia among tribal populations in India highlights the need for urgent attention and action to address this public health issue.
- Effective interventions, such as iron supplementation, nutrition education, and disease control measures, should be implemented to reduce the burden of anemia in this population.

IV. Discussion:

The findings of this review highlight the high burden of anemia among tribal populations in India. The prevalence of anemia is significantly higher among tribal women and children, indicating a need for targeted interventions. Iron deficiency, malnutrition, and infectious diseases are the major risk factors contributing to anemia in this population.

V. Recommendations:

1. Implement targeted iron supplementation programs for tribal women and children.
2. Promote nutrition education and awareness among tribal communities.
3. Strengthen infectious disease control measures, including malaria and hookworm control.
4. Improve access to healthcare services, including diagnostic facilities and treatment.
5. Conduct regular surveillance and monitoring to track the prevalence of anemia and evaluate the effectiveness of interventions.

VI. Limitations:

This review has some limitations, including the heterogeneity of the included studies and the lack of representation from all states in India. Future studies should aim to address these limitations and provide more comprehensive data on the prevalence of anemia among tribal populations in India.

VII. Conclusion:

Anemia is a significant public health concern among tribal populations in India. The findings of this review emphasize the need for comprehensive interventions, including iron supplementation, nutrition education, and infectious disease control. Healthcare policymakers and practitioners must prioritize the health needs of tribal populations to reduce the burden of anemia and improve overall health outcomes.

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