



An Investigating Nutritional Anemia and Blood Group Relationships in Adolescent Females

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ABSTRACT:

This study looks on the connection between blood group types and nutritional anaemia in teenage girls. Inadequate consumption or absorption of certain minerals, such as iron, results in nutritional anaemia, which continues to be a serious public health issue, especially for young women. This research aims to determine the epidemiological associations of blood type prevalence and dietary anaemia in teenage females living in rural parts of India. Cross-sectional research involving teenage females from 10 different regions of India was conducted. Haemoglobin estimate and a blood grouping kit were used to get the necessary data. The percentage of teenage females who supported O and B positive was 47.11% and 26.5%, respectively, with 15.8% supporting A positive. There were less negative blood group percentages found in this investigation, and no AB negative blood group was documented. The future foundation of our country will be the children and teenage females in particular, who need early screening and treatment as well as careful attention to their nutrition. Effective plans, such as the eradication of anaemia in children and teenage girls, may be formulated by government, non-governmental organizations, and the community via long-term strategies. Comprehending these associations may provide significant knowledge for customized therapies and dietary guidelines based on blood group types, eventually leading to improved approaches for averting and controlling nutritional anaemia in teenage girls.

Keywords: Nutritional anaemia, Blood group, Adolescent females, Haemoglobin.

INTRODUCTION:

A serious public health problem continues to be nutritional anaemia, especially among teenage girls. This is because adolescents are particularly susceptible to the condition because of their fast development, monthly blood

loss, and often insufficient vitamin intake. The condition known as anaemia, which is defined by low levels of haemoglobin in the blood, may have significant effects on a person's physical health, cognitive development, and general well-being overall. To add insult

to injury, recent studies have shown that there may be a connection between blood group types and the likelihood of developing anaemia, which calls for a comprehensive examination.

1. Background on Nutritional Anaemia:

Nutritional anaemia is a disorder that is largely brought on by deficits in vital nutrients that are very important for the development of red blood cells. Particularly important are the roles that iron, folate, and vitamin B12 play among these minerals. The most widely recognized sort of healthful paleness is known as lack of iron deficiency anaemia (IDA), and it is liable for a sizeable part of the complete number of occasions of sickliness that happen all around the globe. Because of the increased iron needs that occur throughout puberty, adolescent girls are especially prone to iron deficiency anaemia (IDA). This vulnerability is aggravated by variables such as poor dietary habits, monthly blood loss, and restricted availability to foods that are rich in nutrients.

In addition to weariness and weakness, nutritional anaemia may also result in reduced cognitive function and poor physical performance. These are just some of the serious repercussions that can arise from this condition. Over the course of a longer period of time, untreated anaemia may result in developmental delays, problems during pregnancy and delivery, and higher

morbidity and death rates, particularly in areas where resources are limited.

2. Epidemiological Significance:

The World Health Organization (WHO) estimates that there are around 1.62 billion individuals who are afflicted by nutritional anaemia. This constitutes a significant burden on public health across the world. The prevalence rates of the condition are often higher among female adolescents than they are among their male counterparts, indicating that girls are disproportionately afflicted. There are a number of factors that contribute to the high incidence of anaemia in this age. Some of these factors include a lack of dietary variety, restricted access to foods that are rich in iron, and the beginning of menstruation, which increases our need for iron.

Anaemia has a wide-ranging influence on the lives of teenage girls, impacting not only their physical health but also their school performance, their professional output, and their general quality of life. Studies have revealed that there is a correlation between anaemia and lower school attendance, diminished cognitive function, and decreased academic performance. This highlights the need of focused treatments to address this multidimensional problem.

3. Blood Group Associations:

Blood group types and susceptibility to a variety of health issues, including anaemia, have been the subject of recent study that has revealed

the possibility of links between the two. It is possible that blood type antigens, such as those that are located on red blood cells, might have an effect on the absorption, use, or metabolism of nutrients, which in turn can have an effect on the likelihood of a person getting anaemia. Investigating the connection between blood group types and the occurrence of anaemia might give useful insights into the physiological processes that are at play underneath these connections, despite the fact that the mechanisms that underlie these associations are still only partially known.

Blood type variations have been the subject of research, and these studies have uncovered possible connections between blood group variations and ailments such as cardiovascular disease, gastrointestinal problems, and some infectious diseases. On the other hand, there is a paucity of study with regard to the connection between blood group types and nutritional status, especially in the setting of anaemia among female adolescents.

4. Rationale for Investigation:

The possible interaction between nutritional anaemia and blood type variations is still largely researched, especially in the context of teenage populations. This is despite the fact that both of these disorders are becoming more recognized as important health issues. Through the investigation of the

association between blood group types and the incidence or severity of nutritional anaemia, it may be possible to gain useful insights into the physiological processes that are at play and to suggest therapies that need specific attention.

Researchers are able to shed light on the ways in which genetic factors may interact with dietary intake and metabolic processes to influence an individual's susceptibility to anaemia by examining potential associations between blood group types and indicators of nutritional status. These indicators include serum iron levels, ferritin, folate, and vitamin B12 concentrations. For the purpose of establishing individualized methods to the prevention and treatment of anaemia that are suited to the specific requirements of teenage girls, it is vital to have a solid understanding of these interactions.

REVIEW OF LITERATURE:

P. Sari, D. M. D. Herawati, M. Dhamayanti, and D. Hilmanto (2022) are the creators of the study. The motivation behind this examination is to explore the factors that are related with sickliness in high school females, as well as the effect that pallor has on the personal satisfaction. West Java, Indonesia was where the examination was done in the Soreang Region. It was a cross-sectional exploration that included 286 female understudies

between the ages of 15 and 19. To decide the dietary utilization, a 24-hour review poll was utilized. Using the WHOQOL-BREF, we direct an examination of the personal satisfaction. The specialists took a slim blood test as well as estimating the members' level, weight, weight file (BMI), and mid-upper arm boundary (MUAC) to gauge their haemoglobin levels. To decide the factors that greatest affect iron deficiency, bivariate and various calculated relapse tests were done. The occurrence of weakness was equivalent to 14.3 percent. The length of blood show each menstrual cycle, iron intake, weight, height, and MUAC were all characteristics that were evaluated in this research as potential contributors to anaemia. The social ties domain was impacted by anaemia, as shown by bivariate analyses, with a p-value of less than 0.05. According to the findings of multivariate logistic regression, the parameters that had the greatest impact on anaemia were the length of blood per menstrual cycle and the MUAC. There was an effect of anaemia on the realm of social connections. MUAC and the amount of blood that was shed throughout each menstrual cycle were the two primary parameters that were shown to have an effect on anaemia in this research.

Sanchaisuriya, K., Sanchaisuriya, P., Fucharoen, G., Fucharoen, S., and Ahmed, F. (2020) are the creators of the review. Jamnok, J. Participating in this

cross-sectional exploration were 399 ladies who were not pregnant and gone in age from 18 to 45 years of age. These ladies came from three schools situated in the northeastern area of Thailand. Information connected with chose socio-segment factors, a background marked by blood misfortune, the regular admission of red meat and tea or espresso, and anthropometric data were accumulated. It was laid out whether the patient had thalassemia utilizing a total blood count, which incorporated the grouping of haemoglobin (Hb), serum ferritin (SF), and C-responsive protein (CRP). To decide the factors that put sickness and ID in danger, various calculated relapses were undertaken. After eliminating ladies who had extreme or halfway thalassemia diseases or potentially the people who had a positive serum CRP, a sum of 370 people was incorporated to direct information examination. It was shown that the predominance of weakness, iron lack paleness (ID), and iron inadequacy frailty (IDA) were, separately, 28.4, 28.4, and 13.2%. When contrasted with ladies who didn't have thalassemia, the individuals who had the condition had a decreased rate of ID however a more prominent frequency of iron deficiency in view of their condition. Using different relapse investigation, it was shown that people with ID [adjusted chances proportion (AOR) = 4.9, 95% certainty stretch (CI) = 2.8-8.3], two α -

quality anomalies (AOR = 8.0, 95% CI = 3.0-21.3), and homozygous Hb E (AOR = 8.5, 95% CI = 3.0-24.3) could be risk factors for frailty. Also, the dangers of ID were impressively more noteworthy among ladies who had given blood during the past 90 days (changed chances proportion = 6.7, 95% certainty stretch = 2.8-16.3) and had moderate to high measures of blood misfortune during period (changed chances proportion = 2.2, 95% certainty span = 1.3-3.9).

Among the creators of the 2021 review are Krishnan, V., Zaki, R. A., Nahar, A. M., Jalaludin, M. Y., and Majid, H. A. In this exploration, optional information investigation was performed utilizing data got from the Malaysian Wellbeing and Youths Longitudinal Exploration Group (MyHeART) assessment. In this review, a shut companion optional information examination was led on a powerful partner comprising of 528 young people (151 guys and 377 females) who were 13 years of age and going to auxiliary school. These teenagers were followed up at the ages of 15 and 17 years. At the point when the haemoglobin level was under 12g/dL in light of the full blood count (FBC), the situation with weakness was distinguished. Lack of iron paleness (IDA) was analysed when the Mentzer File was under 13. To investigate the longitudinal connection between healthful status and way of life on frailty status over a time of five

years, a summed up assessing condition (Well) was developed. There was an impressive vertical pattern in the commonness of weakness across all age gatherings (7.9%; 95% CI: 2.3-11.1, 13.9%; 95% CI: 10.8-15.7 and 15.8%; 95% CI: 3.8-23.1) at 13, 15, and 17 years, separately, especially among females. This was outstandingly valid for the more youthful age bunch. The rate of paleness among females has additionally been displayed to have impressively ascended across all age gatherings (11.1%; 95% certainty stretch: 6.7-17.8, 15.7%; 95% certainty span: 11.4-21.3, 23.1%; 95% certainty stretch: 16.8-31.0). At the point when it came to the commonness of IDA among people who were weak, a comparative example was seen (66.5%; 95% CI: 40.4-85.3, 72.2%; 95% CI: 54.8-85.4, 76.3%; 95% CI: 59.2-87.7). Sickliness (relative gamble = 1.517; 95% certainty stretch = 1.012-2.275; $p = 0.044$) and iron inadequacy weakness (relative gamble = 1.776; 95% certainty span = 1.225-2.57; $p = 0.002$) were considerably related with youths who didn't surpass the Suggested Supplement utilization (RNI) for complete iron utilization each day, as per a longitudinal report, which was led utilizing Hmm .There is a general upward trend in the prevalence of anaemia among teenagers, and the research found that female adolescents are more likely to suffer from anaemia than male adolescents.

A. Utami, A. Margawati, D. Pramono, and D. R. Wulandari (2022) are the authors of the study. At an Islamic boarding school in Semarang, Indonesia, in November of 2020, cross-sectional research was carried out on the female adolescents who were enrolled there. Cluster sampling was used to pick a total of 162 individuals to submit responses. The Cyanmethemoglobin technique was used to ascertain the presence of anaemia by determining the quantity of haemoglobin present in the blood. By use of questionnaires, information on food habits and knowledge was gathered. Subsequent to deciding the singular's weight and level, the nourishing status was assessed and afterward classified by the weight file for age utilizing WHO Anthro. To assess the speculation, both bivariate and multivariate calculated examination were utilized, and the importance not entirely settled to be $p < 0.05$. It was shown that 17.3 percent of individuals experience the ill effects of sickness. As indicated by the consequences of the bivariate investigation, the individuals who were overweight had a fundamentally higher likelihood of having iron deficiency ($p = 0.044$). There was no connection between the training level of the dad, the schooling level of the mother, information, the recurrence of staple food sources, breakfast propensities, utilization of creature side dishes, utilization of

vegetable side dishes, utilization of sweet tea, and frailty. Both being overweight (odds ratio = 3.658; 95% confidence interval = 1.224-10.932; $p = 0.020$) and having a high level of knowledge (odds ratio = 3.652; 95% confidence interval = 1.221-10.922; $p = 0.020$) were shown to be significantly linked with anaemia. A substantial correlation was found between anaemia in teenage females and their nutritional state as well as their level of education.

In the year 2023, Munro, M. G., Pole, A. E., Powers, J. M., Kouides, P. A., O'Brien, S. H., Richards, T., and Duty, B. S. distributed their findings. The side effect of exorbitant month to month stream is very normal among ladies of regenerative age and is a huge calculate the improvement of lack of iron and iron insufficiency frailty, which is the most extreme indication of lack of iron side effects. In addition to the fact that it is recognized that these two clinical elements are very conspicuous, yet it is likewise recognized that their connection isn't surely known and is regularly standardized by society, medical care experts, and the young ladies and ladies who are affected what themselves' identity is impacted. The personal satisfaction is harmed by both weighty month to month draining and iron lack, whether or not or not sickness is available. Weighty feminine stream during episodes of draining and lack of iron consistently are specifically hindering to personal satisfaction.

These consolidated issues adversely affect the existences of young ladies of conceptive age as well as ladies, everything being equal, from menarche to menopause, and the way that they are in some cases unobtrusive and hard to see frequently prompts business as usual about these issues. The results on mental capability, as well as the related truancy and presenteeism at work and school, can possibly weaken the endeavours and elements of ladies in all parts of life, whether they are understudies, educators, bosses, or labourers. Moreover, there is a developing group of proof that recommends that lack of iron, even in the beginning phases of pregnancy, may adversely affect the neurodevelopment of the baby, which might meaningfully affect different mental and mental problems. This is a critical collection of proof that requires the standardization of iron stores in ladies who are of regenerative age.

O. Nainggolan, D. Hapsari, C. R. Titaley, L. Indrawati, I. Dharmayanti, and A. Y. Kristanto (2022) are the creators of the previously mentioned study. The data was acquired from the Basic Wellbeing Exploration Information of Indonesia for the year 2018. The information that we used came from 11,471 ladies between the ages of 19 and 49 who were not pregnant. Iron deficiency, characterized as a haemoglobin level under 12 g/dL, was the reliant variable investigated.

Ladies' healthful status, which was a composite sign of weight file (BMI) and mid-upper arm boundary (MUAC), was the free factor in this review. We represented factors, for example, the age of the ladies, their degree of instruction, their degree of active work, how much products of the soil they consumed, and whether they had any transferable or non-transmittable problems. The investigations of strategic relapse were completed by us. The predominance of pallor was viewed as 22.3% among ladies matured 19-49 years who were not pregnant, with a 95% certainty stretch (CI) going from 21.4 to 23.3. It was shown that ladies who were overweight or stout had a lower chance of creating frailty contrasted with the people who had a typical weight record (BMI), free of their MUAC score. It was shown that ladies who were underweight and had poor MUAC scores had the best probability of getting weakness (changed chances proportion [aOR] = 2.83, 95% certainty stretch [CI]: 2.19-3.68) individually. Ladies who didn't take part in adequate actual work were displayed to have higher chances proportions, in spite of the way that they consumed a sufficient measure of leafy foods (changed chances proportion = 1.87, 95% certainty span: 1.06-3.28). Then again, ladies who had procured a conclusion of a non-transferable condition had a lower likelihood of obtaining weakness

(changed chances proportion = 0.75, 95% certainty stretch: 0.67-0.83).

RESEARCH METHODOLOGY:**1. Research Design:**

In the year 2023, a population-based cross-sectional survey was carried out in rural parts of India. The study used a multistage stratified random sampling approach to collect data. The research included 10 different regions in India, including Mandya and Raichur in the state of Karnataka, Warangal in the state of Telangana, Junagadh in the state of Gujarat, Hoshiarpur and Jalandhar in the state of Punjab, Darbhanga in the state of Bihar, Alwar in the state of Rajasthan, Jalgaon in the state of Maharashtra, and Tiruppur in the state of Tamil Nadu. The time period covered by the research project was from September 2023 to November 2023. Before beginning the prevalence research, the appropriate ethics committee was consulted in order to gain authorization from the Institutional Ethics Committee.

2. Sample Size:

Using a straightforward random sampling method, a sample size of three hundred children and adolescents was chosen for the purpose of conducting blood analysis to evaluate the amount of haemoglobin (Hb) present, with a particular emphasis on nutritional anaemia. In order to arrive at this sample size calculation, we assumed that the prevalence of anaemia in

school-aged children was 72%, that the confidence interval (CI) was 97%, that the power was 92%, and that the relative precision was 10%. It is possible that the actual sample size that was covered was different from what was expected owing to various limitations that were encountered throughout the survey.

3. Selection of Subjects:

The proportion to population size (PPS) approach was used all throughout the process of determining the sample size for each of the villages that were chosen. For the purpose of this research, the protocol was authorized by the scientific advisory council, and permits and written informed consent were acquired from the school officials and the parents, respectively. The participants were divided into three age groups: those aged 10 to 12 years, those aged 13 to 15 years, and those aged 16 to 19 years.

4. Blood Sample Collection and Technique:

The collection of fundamental socio-demographic information was followed by the collection of finger-prick blood samples for the purpose of identification of blood groups and the calculation of haemoglobin levels. We used a Finn pipette with a fixed capacity to collect a finger-prick blood sample that was 20 microliters in volume. An established approach was used for the analysis of blood grouping, and a colorimeter was utilized for the

cyanmethemoglobin method in order to determine the amount of haemoglobin present in the blood. A number of trained professionals, including medical officers, diagnostic specialists, dietitians, and social workers, participated in this inquiry and underwent previous training before being sent to the field.

RESULTS AND DISCUSSION:

Over the most recent decade, there has been a huge expansion in the worldwide interest in issues relating to the soundness of teenagers. This pattern started with the Global Year of Youth in 1985 and went on with the World Wellbeing Get together in 1989, the two of which zeroed in on the soundness of youngsters. Young ladies are a weak populace that is engaging with sickliness, especially in non-industrial nations where they are commonly hitched early in life and are presented to a bigger gamble of conceptive horribleness and mortality. This is especially true in countries where girls are married at a younger age than boys. There is a genuine potential to make a change in habits that will last a lifetime throughout the adolescent years. As a result of factors such as poverty, insufficient food, certain illnesses, pregnancy and breastfeeding, and limited access to health care, the

incidence of anaemia is much higher in developing nations than in developed ones.

A high maternal mortality ratio (MMR), a high incidence of kids born with a low birth weight, a high perinatal mortality and fatal wastage rate, and therefore high fertility rates are all factors that contribute to nutritional anaemia in this population. A adequate iron status can be guaranteed throughout adolescence, which is another reason why this stage of life is significant. There is a growing body of research suggesting that it may be easier to treat anaemia in pregnant women if the iron status is maintained during this stage. It is essential to have a solid understanding of the epidemiology in order to effectively develop interventions. As a result, the current research was conducted with the purpose of investigating the epidemiological factors that are associated with nutritional anaemia and the prevalent blood grouping among teenage girls living in rural India. The number of individuals was broken down according to age as opposed to geographical location.

A screening was conducted on the individuals in order to determine the different blood types, and the findings are shown in table 1.

Table 1: Number of Subjects involved in various blood groups

Area	A+ve	A1+ve	B+ve	AB+ve	O+ve	A-ve	B-ve	O-ve	Total
Mandya	11	0	6	3	11	0	0	0	31
Warangal	2	5	6	4	7	1	0	0	25
Junagadh	8	0	7	2	15	0	1	1	34
Raichur	1	4	9	2	19	0	0	1	36
Hoshiarpur	4	0	13	1	26	0	1	2	47
Darbhanga	10	0	14	3	22	0	0	1	50
Alwar	3	5	6	2	20	0	0	0	36
Jalgaon	4	5	7	2	17	0	0	0	35
Jalandhar	2	2	6	1	18	0	0	0	29
Tiruppur	5	10	22	3	20	1	0	0	61
Total	51	71	52	55	41	11	9	10	300

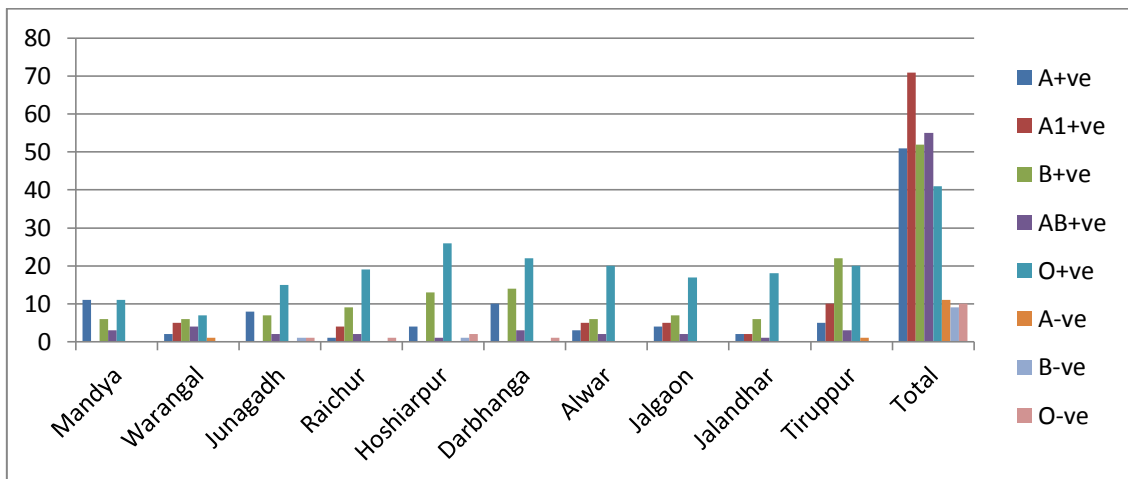


Figure 1: Percentage positivity of various blood groups among subjects included

Considering the way that the improvement of pallor is an outcome that happens at a later phase of lack of iron, the issue of iron lack in these young ladies, which has a predominance of 59.8%, must be viewed as critical and calls for move to be made. The predominance of typical, gentle, moderate, and serious paleness was viewed as 19.9%, 4.3%, 21.9%, and 53.9% correspondingly among the 300 members who were inspected for this

exploration (Table 2). Because of the focus placed on reducing the overall incidence of anemia in teenage females, there is a high frequency of mild and moderate anemia. Such anemia warrants attention. Included in the preventative measures for teenage females in India is the provision of nutrition instruction in educational institutions. It is possible that the impact of iron deficiency in adolescents from upper-class families will not be of

great consequence. This is due to the fact that the availability of superior health care, antenatal care, and consistent consumption of iron folate preparations, as well as improved food quality during pregnancy, would eliminate the iron deficiency that is acquired during adolescence.

Between the ages of 13 and 15, as well as between 16 and 19, there was

a significant prevalence of severe anaemia on account of Inadequate nutrition during the adolescent years, stress brought on by education, and the failure to replace iron deficiency during menarche are all factors that contribute to this condition. Deficiency in vitamin D, calcium, and other nutrients.

Table 2: Anaemia in Adolescents

Age Group	Anaemia Level	Level of Haemoglobin (gm/dl)	No. of Girls Observed (n=300)
10-12 years	Normal (>11)	52	22.80%
	Mild (10.0 - 10.9)	12	5.30%
	Moderate (7.0 - 10.0)	43	18.80%
	Severe (<7)	121	53.10%
13-15 years	Normal (>11)	59	15.70%
	Mild (10.0 - 10.9)	13	3.50%
	Moderate (7.0 - 10.0)	112	29.90%
	Severe (<7)	191	50.90%
16-19 years	Normal (>11)	81	22.50%
	Mild (10.0 - 10.9)	16	4.50%
	Moderate (7.0 - 10.0)	56	15.60%
	Severe (<7)	206	57.40%

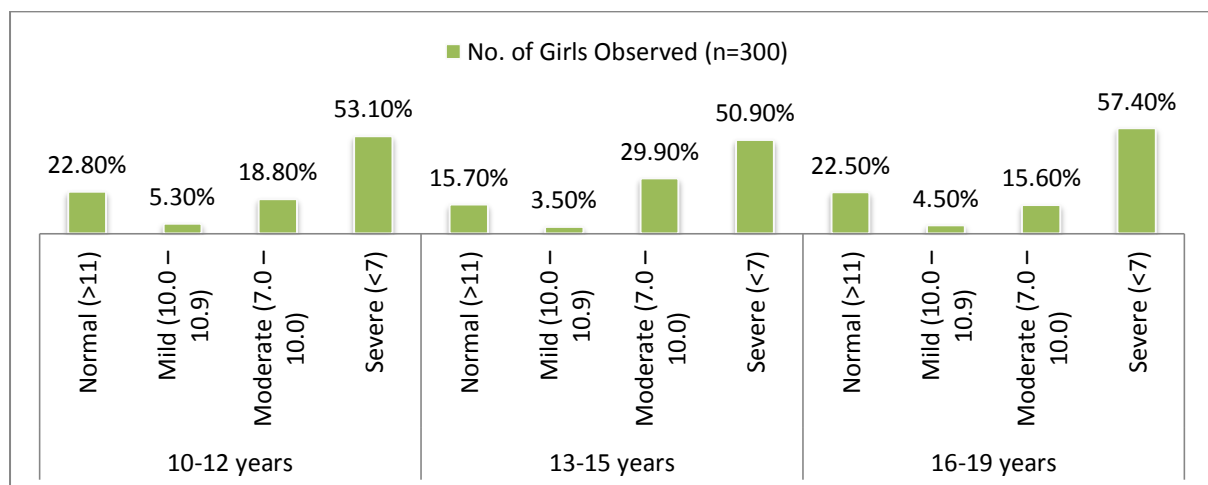


Figure 2: Anaemia in Adolescents

Since 1997, the government of India has included the concern for the health of adolescents as a component of the RCH package. In this age range, anaemia has been recognized as a significant health issue, which was followed by further reinforcement at the International Conference on Population and Development that took place in Cairo in the year 1994. In contrast to the findings of prior investigations, which revealed a prevalence rate of 73.7% and 74.7% respectively [18, 19], the prevalence of anemia was found to be 80.1% in the current research. It is possible that the variances in the study region are the cause of these variations in the prevalence of anemia rates. According to the World Health Organization and the United Nations Children's Fund (UNICEF), the issue of anemia is considered to be of extremely high scale in a community when the prevalence rate is more than forty percent.

CONCLUSION:

Following an examination of three hundred people, it became clear that the great majority of them were classified as having anemia according to the rules established by the World Health Organization (WHO), with mild, moderate, and severe instances being the most common. There was a significant increase in the number of cases of severe anemia among

individuals between the ages of 13 and 15 and 16 and 19 years old. In spite of this, the research was plagued by a number of restrictions. In the first place, there were no treatments planned, which means that prospective paths for dealing with anemia were not investigated. The second issue is that the inquiry into worm infestation among rural women has not been thoroughly studied, which represents a significant gap in understanding the probable causes that contribute to the problem. Last but not least, a portion of the sample did not have complete haemoglobin estimates since neither the hemocoel nor the cyanmethemoglobin techniques were used. This prevented the research from gaining possibly more in-depth insights on the prevalence and severity of anaemia.

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