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To Assess the Nutritional Status and Prevalence of Anaemia in Adolescent Girls Aged 12-18 Years in Government Schools in Tumkur

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A B S T R A C T

Background*:** Anaemia, a condition characterized by a deficiency of red blood cells or haemoglobin, poses a significant public health challenge globally, particularly among vulnerable populations such as adolescents. In India, the prevalence of anaemia among adolescents is alarmingly high, with various studies indicating rates ranging from 40% to over 65% in specific regions. ***Materials and Methods: This study was a cross-sectional studyconducted in the Government High Schools in Tumkur and the participants were Adolescent girls between 12-18 years of age attending government schools in Tumkur and who were willing were enrolled for the study after obtaining the writteninformed consent. Thesamplesizeconsidered was 600cases.Thestudyincludedchildrenagedbetween 12 and 18 years of age and excluded the Age group <12years and >18 years, Girls with any genetic disease, metabolic problems or chronic diseases, Girls not giving consent were excluded from the study.***Results*:**Mean height of 158.8+-7.37cm, Mean weight of 54.19+-9.34kg, Mean BMI of 22.03+-3.39 kg/m2. Mild anaemia -366 students, Moderate anaemia -32 students, Severe anaemia -44 students, Normal – 158 students. Stunting was noted in 308 anaemics .236 had LOW BMI with anaemia and 31 was obese. Prevalence of anaemia was 73.6%.***Conclusion*:** Anaemia is prevalent among teenage female students. Implementing regular screening programmes and surveys can aid in the identification of these girls and provide prompt provision of therapy.

Keywords: Anaemia, adolescent, prevalence.

INTRODUCTION

Globally, anaemia—a disorder marked by a lack of red blood cells or haemoglobin—presents a serious public health concern, especially for susceptible groups like teenagers. According to estimates from the World Health Organization (WHO), anaemia affects 1.62 billion people globally, with developing nations having the highest prevalence. Increased dietary demands during this crucial growth phase raise the risk of anaemia in teenagers, particularly in girls. Adolescent anaemia is incredibly common in India; different studies have found that rates can range from 40% to over 65% in particular areas [1, 5, 7]. Numerous variables, including as inadequate diet, socioeconomic circumstances, and menstrual-related hormonal changes, contribute to this population's vulnerability to anaemia.

A critical period in human development, adolescence is marked by fast physical development and maturation. Increased dietary intake is necessary at this time to promote reproductive health and body changes. Adolescent girls are particularly susceptible to iron deficiency anaemia (IDA) due to the extra iron requirements that come with the onset of menstruation. The frequency of anaemia is particularly high in developing countries such as India, where availability to foods high in micronutrients is restricted and dietary diversification is frequently limited [3, 6].

Due to these combined nutritional requirements and sociocultural variables that may restrict their food consumption, studies have revealed that teenage girls suffer from anaemia at a disproportionate rate to their male counterparts [2, 4].

Numerous nationwide studies have provided ample documentation of the prevalence of anaemia among Indian adolescents. According to the Comprehensive National Nutrition Survey (CNNS), anaemia affects approximately 40% of Indian teenagers, with females being far more affected than boys [5]. High rates of anaemia among teenage females were also observed by the National Family Health Survey (NFHS), highlighting the critical need for focused interventions. In order to address this issue, government programs like the Anaemia Mukt Bharat (AMB) program encourage iron and folic acid supplementation among adolescents enrolled in school; nonetheless, implementation and coverage gaps still exist [4][6]. Many teenagers are still ignorant about their nutritional requirements and the value of a varied diet in spite of these initiatives, socioeconomic contexts.

Because of financial limitations, government schools usually serve underprivileged populations that are more likely to suffer from nutritional inadequacies. By focusing on this age range, the study hopes to gather information that accurately represents the particular difficulties these teenagers encounter with anaemia. Because it includes important development milestones and the onset of menstruation, both of which are strongly associated with elevated iron requirements, the 12–18 age range is especially important [1, 3]. Even while anaemia is acknowledged as a serious public health concern, there is still a dearth of specific information about its prevalence and correlates among Indian teenagers, especially when it comes to anthropometric measures like height and body mass index (BMI).

Effective public health planning and resource allocation to lessen the effects of anaemia on this susceptible group are hampered by this knowledge gap. Knowing the relationship between anaemia and height and BMI can help develop focused interventions that improve teenage girls' nutritional status and general health outcomes [2, 5]. Because height and BMI may be related to general health and nutritional status, they were used as anthropometric measures for this investigation. Anaemia can occur as a result of prolonged sickness or poor nutrition, both of which are indicated by a low BMI. In a similar way, height throughout important growth phases can serve as a predictor of long-term nutritional status.

Biological mechanisms may link body composition with nutrient absorption; for instance, individuals with higher muscle mass may have different iron metabolism compared to those with lower muscle mass [3, 6]. Thus, assessing these indicators may offer insights into broader nutritional deficiencies affecting adolescent girls.

AIM

To assess the nutritional status and prevalence of anaemia in adolescent girls aged 12-18 years attending Government high schools in Tumkur.

OBJECTIVES

The major objectives of this study are to assess

1. Anthropometric status of girls aged 12 -18 years
2. To assess the prevalence of anaemia ingirls 12-18 years
3. To assess the correlation between anaemia and nutritional status

MATERIALS AND METHODS

Adolescent girls between 12-18 years of age attending Government schools in Tumkur and who are willing will be enrolled for the study after obtaining the written informed consent. It was a cross-sectional study over period of 24 months fromJuly 2022 to July 2024 with a sample size of 600.

Inclusion Criteria:

- Girls attending Government school
- Age group 12-18 year
- Studying in Std VII-XII

Exclusion Criteria:

- Age group <12years and >18 years
- Girls with any genetic disease, metabolic problems or chronic diseases
- Girls not giving consent

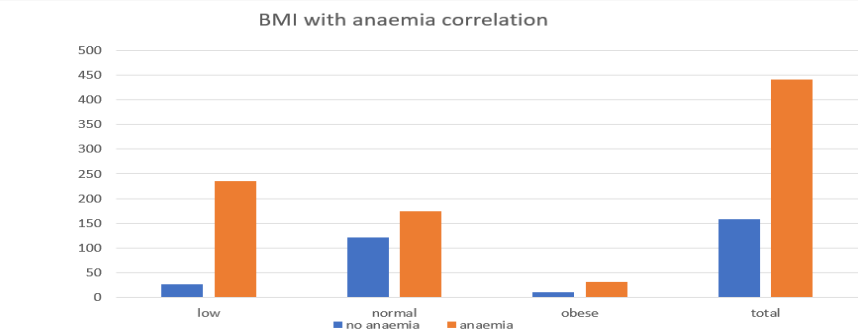
METHODS OF COLLECTION OF DATA

- Children fulfilling the inclusion criteria were selected.
- Informed written consent was obtained from the parents and they were included in the study. Detailed history using the questionnaire and clinical examination was carried out.

- Height, Weight, BMIwas assessed, Children were made to stand straight without footwear, with hands hanging by the side, feet parallel and with the heels, gluteal region, shoulders and occiput touching the wall. Height was measured using a stadiometer with a near accuracy of 0.5cm.
- Children were instructed to stand on weighing scale looking straight without footwear with feet apart. Weight was measured to the nearest 0.5 kg. Body mass index was calculated using the formula: BMI = Weight in kg / Height in metre^2.
- Haemoglobin estimation was performed using HemoCue (Hb 201). The sensitivity of HemoCue is 75%–91%, and the specificity is 88%–100%. The anaemia status of the study participants werescored using WHO cut-off points for anaemiadiagnosis [3].
- Capillary blood was collected from the study subjects by pricking the finger tips by Lancet. A separate lancet was used for each individual to avoid cross infection. Aseptic conditionwas maintained during the procedures. Haemoglobin (Hb) estimation was done using haemoglobin cuvette. Separate Hemocue cuvettes were used for each participant and same calibrated instrument were used throughout the study.
- Data was collected and tabulated in MS Excel and analyzed using SPSS software version 22.0.

RESULTS

HAEMOGLOBIN	NUMBER OF STUDENTS
<8 (SEVERE)	44
8 TO 10.9 (MODERATE)	32
11TO 11.9 (MILD)	366
>12 (NORMAL)	158



BMI	No Anaemia	Anaemia
Low	26	236
Normal	122	175
Obese	10	31
Total	158	442

CORELATION OF ANAEMIA AND BMI

	F	P
Height, BMI, Hb (gm/dl)	86378.35	<.001

Height	No Anaemia	Anaemia
Stunting	48	308
Normal	110	134
Total	158	442

DISCUSSION

In this study, out of 442 anaemics 308(69.6%) were stunted,48 students with no anaemia had stunting. Of the students with normal height,134 had anaemiawhereas 110 had no anaemia. Majorityof the students with stunting were diagnosed to have anaemia.

Low BMI was associated with 236 anaemics (53.3%), 175 had normal BMI and 31 anaemics were obese.

Prevalence of anaemiain the population studied was found to be 73.6%. The nutritional status and prevalence of anaemia among adolescent girls in Karnataka is a pressing public health concern that reflects broader trends observed in similar studies across India. In this research, we assessed the Body Mass Index (BMI) of adolescent girls aged 12-18 years, comparing our findings with recent studies to contextualize the nutritional landscape.

Our study found a significant prevalence of anaemia, consistent with findings from other regions. For instance, a cross-sectional study in Gujarat reported a staggering 69% prevalence of anaemia among adolescent females, highlighting the urgent need for targeted interventions (Parmar *et al*., 2022) [10]. Additionally, a study conducted in Western India indicated that 19.6% of adolescent girls were underweight, with a mean BMI of 19.77 kg/m², suggesting a concerning trend of malnutrition (Saha *et al*., 2021) [9].

Comparatively, research from various states reveals similar patterns. A national survey indicated that the prevalence of thinness among adolescent females was 52.5%, with urban areas experiencing higher rates of overweight (Parmar *et al*., 2022) [10]. Furthermore, a longitudinal analysis demonstrated that while there was some improvement in BMI and anaemia prevalence from 2005 to 2015, significant disparities remained based on socio-economic status (Kumar *et al*., 2021) [11].

Another relevant study from Brazil found that overweight girls had lower haemoglobin levels than their non-overweight counterparts, indicating a complex relationship between BMI and anaemia (Mello *et al*., 2012) [8]. This suggests that both undernutrition and overweight can coexist as risk factors for anaemia among adolescents.

In a study conducted by Tura *et al*., prevalence was 23.8%, stunting was noticed in 30.9% withanaemiaand normal height in 38.2% anaemics [12].

In a study done by Srivastava *et al*., 56.5% stunted and 67.1% had normal height [13]. In the study by Kulkarni *et al*., 22.9% anaemics were stunted [16].

Studies on anaemia prevalence by Yusufu *et al*., Daniel *et al*., Kulkarni *et al*., and Mitkari*et al*., showed prevalence of 53.3%, 65.75, 90.1% and 67.3% respectively [14-17].

Conflict of Interest and Financial Support – NIL
Ethical approval -- The study was approved and ethical clearance taken from the Ethics committee, Sri Siddhartha Medical College, Tumkur, Karnataka.

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