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Prevalence of Folic Acid And Vitamin B12 Deficiency in Anemic Adolescents

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ABSTRACT



Adolescents may enjoy nourishment trends, macrobiotic weight control plans and semi-starvation regimens in calories, nutrients and minerals. Protein need in a juvenile for every unit body weight is higher than that of grown-up; however, not exactly a quickly developing newborn child. Adolescence has higher nutrient and mineral needs contrasted and individuals all things considered other life stages. A community-based cross-sectional study of 200 school going anaemic adolescents of age group 10 – 19 years. A pre-designed semi-organized survey was readied dependent on the audit of writing on Adolescent iron deficiency. The study included 200 anaemic adolescents belonging to two schools, 89 were males, and 111 were females. Male: female ratio was 1.25:1. Among a total of 200 participants, 122 anaemic adolescents belonged to early adolescence. The mean age of anaemic adolescent participants of this study was 13.19 years with a standard deviation of 1.23. among the participants, 137 anaemic adolescents took a vegetarian diet, and 63 anaemic adolescents took a mixed diet. There were three participants underweight according to BMI classification, and 190 had normal range of BMI, 132 adolescents had moderate anaemia (Hb- 8.0 to 10.9). Majority of 66.5%(133/200) had Vitamin B12 deficiency anaemia, 72.5%(145/200) had folic acid deficiency anaemia, and 58.5% (117/200) had combined Vitamin B12 and folic acid deficiency anaemia. Prevalence of anaemia in adolescent is a significant public health concern. Supplementation with not only iron and folic acid but also Vitamin B12 may be need of the day. Besides supplementation adequate education regarding quality food, cooking practices and health education is also necessary to be emphasized in adolescents.

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INTRODUCTION

Anaemia is a boundless dietary issue which is all the more generally found in ladies and youngsters influencing their most pivotal periods like during pregnancy and development respectively (Irwin and Kirchner, 2001). Pre-adult wellbeing is of prime significance since they experience a change from adolescence to adulthood. These adolescent years are a time of extreme development, genuinely, yet additionally intellectually and socially. During this time, 20% of certain grown-up stature and half of the adult weight is acquired. Adolescence is an important period for anorexia nervosa to begin, and

it's associate with brain morphological changes that are grey matter and white matter volume loss and improves again upon weight restoration (Seitz *et al.*, 2016).

Anaemia is one of the leading causes of morbidity in Pediatric age group, including adolescents.

The primary nutrients responsible for the synthesis of haemoglobin are iron, folic acid, and vitamin B12. It is also associated with the impaired performance of a range of mental and physical functions in children and adolescents, along with increased morbidity (Kotecha, 2011).

Adolescents with poor nutritional status is a result of socio-cultural, economic and public policies relating to household food security associated with behavioural dimensions (Sunitha and Gururaj, 2014).

Adolescents female lose a considerable amount of blood loss during menstruation. Additionally eating is impacted by numerous variables, for example, individual confidence, self-perception and making them skip dinners to lose weight and friends humouring them in undesirable nourishment propensities, making them inclined to wholesome frailty.

It has been likewise discovered that mindfulness to iron deficiency and appropriate eating regimen is amazingly poor in young people, which is compounded by rewarding particular crusades of different garbage foods (IIPS, 2007).

Teenagers may enjoy nourishment trends, macrobiotic weight control plans and semi-starvation regimens in calories, nutrients and minerals. Protein need in an immature per unit body weight is higher than that of a grown-up yet not exactly a quickly developing newborn child. Youth have higher nutrient and mineral needs contrasted, and individuals all things considered other life stages (Park, 2006).

This study was conducted in two schools, i.e. Nagar Parishad and a Private school so data collected from different socio-economic strata. The present study is planned to assess the prevalence of folic acid and vitamin B12 deficiency in anaemic adolescents in two schools of Karad city.

Aim and Objectives

1. To study the prevalence of anaemia associated with vitamin B12 deficiency in adolescents in two schools of Karad city
2. To study the prevalence of anaemia related to a folic acid deficiency in adolescents in two schools of Karad city

MATERIALS AND METHODS

Study Setting

The present study was conducted on randomly selected anaemic adolescents attending one school managed by Nagar Parishad and other school governed by a Private trust. We chose these two schools because the Nagar Parishad school was attended mainly by pupils who were from low socio-economic status and middle and upper socio-economic class pupils attended the Private school. The equal number of samples were collected from each school, and also efforts were made to ensure uniformity among data collection.

Study Period

The period of data collection was spread over one year from January to December.

Sample Size

The estimated sample size was 100 from each of the two schools. Participants were included in the study after taking their written informed consent of their parents.

Study subjects

Inclusion criteria

1. Adolescents (10 – 19 yrs.) – Both genders with anaemia
2. Adolescent who full fills the WHO criteria for anaemia (specified overleaf).

Exclusion criteria

1. Age less than 10 yrs or more than 19 yrs.
2. Those are receiving hematinics in past four weeks.
3. Those who received a blood transfusion in past four weeks.
4. Those with known haematological or any other systemic disorder (thalassemia)
5. Those having an apparent infection (fever, diarrhoea, cough or burning micturition) or any chronic disease (Tuberculosis, malaria)
6. Those who refused to give consent.

Study Tools

A predesigned semi-organized poll was readied dependent on the audit of writing on Adolescent sickness.

Ethical Issues

The Scientific and Ethical Committee approved the study protocol of the Institution. All participants and parents were informed about the study procedure and the information required from them for the study. A voluntary informed written consent was taken from the participant parent, and those who consented were included in the study. Strict confidentiality was maintained about the personal details of the participants and information related to the study.

Statistical Analysis

Data management and analysis were done using Microsoft Excel and SPSS version 20.0 software. The frequency distribution and graph were prepared for the variable. The categorical variables were assessed using Pearson chi-square and unpaired t-test. The test was considered significant only if the p-value comes is less than 0.05.

RESULTS

Distribution according to gender

43(43%) males and 57(57%) females in Nagar Parishad school and 46(46%) males and 54(54%) females in Private school.

Distribution to age groups

70 adolescents (28 males, 42 females), belonged to early adolescence (10-13 years) and 30 adolescents (15 males, 15 females), belonged to middle youth (14-16 years). From Nagar Parishad school whereas 52 adolescents (27 males, 25 females), belonged to early adolescence (10-13 years), 48 adolescents (19 males, 29 females), belonged to middle youth (14-16 years) from Private school.

Distribution according to Religion

Out of 100 anaemic adolescents, a. Eighty-three adolescents (35 males, 48 females), where belonging to Hindu religion, 14 adolescents (8 males, 6 females), were belonging to the Muslim faith and three adolescents (0 males, 3 females), were belonging to the Christian faith. From Nagar Parishad school whereas 88 adolescents (43 males, 45 females), were belonging to Hindu religion. b. 6 adolescents (2 males, 4 females), were belonging to the Muslim faith. 3 adolescents (1 male, 2 females), were belonging to the Christian faith from the Private school. The Table 1 depicts that, out of a total of 200 anaemic adolescents, 133 (66.50%) had Vitamin B12 deficiency, 145 (72.50%) had Folic acid deficiency. 117(58.50%) had combined Vitamin B12, and Folic acid deficiency and 39(19.50%) had anaemia with normal serum level of Vitamin B12 and Folic acid.

Table 2 shows out of 133 anaemic adolescents who had Vitamin B12 deficiency anaemia, 78(58.65%) were from Nagar Parishad school and 55(41.35%) were from Private school.

Distribution of anaemic adolescents with Vitamin B12 deficiency from two schools according to gender

78 anaemic adolescents (35 males i.e. 44.87%, 43 females, i.e. 55.13%) from Nagar Parishad school and 55 anaemic adolescents (20 males, i.e. 36.36%, 35 females, i.e. 63.64%) from Private school who had Vitamin B12 deficiency anaemia.

Association between anaemic adolescents with Vitamin B12 deficiency from two schools and age groups association was found between anaemic adolescents with Vitamin B12 deficiency from two schools and age groups. No significant association was found between anaemic adolescents with Vitamin B12 deficiency and religion from two schools.

DISCUSSION

Youngsters structure valuable HR in each nation. Notwithstanding, there is significant vagueness in the meaning of youngsters. Terms like youthful, teenagers, grown-ups, youthful grown-ups are regularly utilized reciprocally. World Health Organization (WHO) defines 'adolescence' as age spanning 10 to 19 year, & youth as those in 15-24 year age group and these two overlapping age groups as —young people covering the age group of 10-24 year ([World Health Organization, 2001](#)). Adolescence is further divided into early adolescence (11-13 year), middle adolescence (14-16 year), and late adolescence (17-19 year) [Paul and Bagga \(2018\)](#). Individuals in the age group of 20 - 24 year are also referred to as young adults ([Jekielek et al., 2005](#)).

Adolescence (from Latin *adolescere*, meaning "to grow up") is a transitional phase of physical and mental human advancement that for the most part happens during the period from pubescence to adulthood (time of larger part) ([Christie and Viner, 2005](#)). Even though pubescence has been generally connected with the beginning of immature advancement, it ordinarily starts preceding the high school years, and there has been a regulating movement of it happening in preadolescence, especially in females ([Žukauskaitė et al., 2005](#)). Physical development, as unmistakable from pubescence (especially in guys), and intellectual improvement for the most part found in pre-adulthood, can likewise reach out into the mid-twenties. In this manner, ordered age gives just an unpleasant marker of youth, and researchers have thought that it was hard to con-

Table 1: Distribution of anemic adolescents from two schools together according to presence of deficiency in total 200 studied adolescents

S. No.	Type of deficiency Anemia	No of anemic adolescents (200)	%
1.	Vitamin B12 deficiency	133	66.50%
2.	Folic acid deficiency	145	72.50%
3.	Combined Vitamin B12 and Folic acid deficiency	117	58.50%
4.	Anemia with normal serum level of Vitamin B12 and Folic acid	39	19.50%

Table 2: Distribution of anemic adolescents with Vitamin B12 deficiency according to type of school

Type of school	No of anemic adolescents with Vitamin B12 deficiency	%
Total 133		
Nagar Parishad	78	58.65%
Private	55	41.35%

cur upon an exact meaning of youthfulness (Cooney, 2010).

On the other hand, the National Youth Policy of India (2003) defines the youth population as those in the age group of 15-35 yr⁶⁶. People aged 10-24 years accounts in 2011 for 373 million (30.9%) of the 1, 210 million of India 's population; thus, every third person belongs to this age group⁶⁷. Among these, 110 and 273 million live in urban and rural India, respectively (Choudhry *et al.*, 2014). Males account for 195 million and females 178 million, respectively. As per the National Sample Survey (NSS), (2007-08), 32.8 per cent of this group attend educational institutions, and 46 per cent (2004-05) are employed (Dev and Venkatanarayana, 2011).

Adolescence is likewise a period of impulsivity joined by helplessness, affected by peer gatherings and media that bring about changes in recognition and practice, and described by dynamic aptitudes/capacities alongside securing of new enthusiastic, intellectual and social skills (Stang and Story, 2005). However, this vital period of life is further complicated by an increased occurrence of anaemia (World Health Organization, 2011). Adolescent age period is of formative years for physical growth, Cognitive and social development, Vitamin B12 and Folic acid deficiency anaemia at this stage of life has some long-term consequences (Bindra, 2017), such as (a) Stunted growth, (b) Poor school performance, reduced attention span, memory loss, the increased school drop-out rate in adolescents, (c) Reduced immunity in adolescent and increased

infection rate, (d) Delay in onset of menarche and menstrual irregularities if already attained, (e) If anaemic adolescents girl becomes pregnant, chances of intrauterine growth restriction in baby, low birth weight neonate, Increased perinatal morbidity and mortality of neonate, are increased along with maternal morbidity and mortality, (f) Directly or indirectly, it affects national and economic growth as well. (g) It can have economic Implications and can be estimated by the costs incurred to prevent this condition, impact on maternal and infant morbidity and mortality, in addition to impaired mental development and poor capital formation of the country (Bindra, 2017).

Gender wise distribution of participants

This study includes 200 adolescents belonging to two schools, among them, 89 were male, and 111 were female. The Nagar Parishad school anaemic adolescent comprised of 43 males and 57 females. Whereas, in private school, anaemic adolescents consist of 46 males and 54 females.

Among a total of 200 anaemic adolescent male-female ratio was 1.25:1. In Nagar Parishad school among 100 anaemic adolescent male-female ratio was 1.33:1. Whereas, in private school among 100 anaemic adolescent male-female ratio was 1.17:1.

According to Census 2011, India has male: female ratio was 1.06:1 (1000:943) (García-Casal *et al.*, 2005). A total number of 51 children studied, among them, male: female ratio was 1.33:1. Studied 95 children for aetiology of anaemia. Among them, 51 were male, and 44 were female children with a male: female ratio 1.16:1.

Age-wise distribution of participants

During adolescence, 20% of body stature and 50 % of adult bone mass is laid down (Singh, 2006). In the adolescent age period marked physical development occurs that included appearance of the secondary sexual characteristics, increase in height, change in body composition and development of reproductive capacity. Therefore, they are particularly susceptible to develop anaemia because of their rapid growth and associated high iron, Vitamin B12 and Folic acid requirements. The mean age of anaemic adolescent participants of this study was 13.19 years with a standard deviation of 1.23. Among the 100 anaemic adolescents from Nagar Parishad school, mean age was 12.97 years with Standard deviation of 1.12. And in 100 anaemic adolescents from the private school, mean age was 13.35 years with Standard deviation of 1.27.

Distribution of study participants according to a grade of anaemia

Anaemia is graded according to haemoglobin levels as mild anaemia (Hb gm%: 11.0 to 11.9 g/dl), moderate anaemia (Hb gm%: 8.0 to 10.9 g/dl) and severe anaemia (Hb gm%: < 8.0 g/dl) (Castle, 1966).

In our study, out of a total of 200 anaemic adolescents mean haemoglobin concentration level was 10.34 ± 1.05 gm/dl, which falls in moderate anaemia. In 100 anaemic adolescents from Nagar Parishad school suggest haemoglobin concentration level was 10.43 ± 1.06 gm/dl, which falls in mild anaemia. In a present study among 133 anaemic adolescents out of 200 anaemic adolescent studied had Vitamin B12 deficiency, In current study higher number of an adolescent in mild and moderate anaemia group may be due to study participants taken from regular healthy school-going adolescents.

Distribution of study participants according to diet

Adolescent's eating routine or eating conduct is affected by numerous variables, for example, individual confidence, self-perception making them skip dinners to decrease weight. It has likewise been discovered that mindfulness concerning the weakness and suitable eating routine is amazingly poor in young people, which is declined by the worthwhile limited time crusades of different garbage foods. Adolescents may enjoy prevailing nourishment fashions and semi-starvation regimens in calories, nutrients and minerals.

Folic corrosive is available in high fixations in diet comprising of vegetables, green vegetables, and a few natural products, vegetables and organic prod-

ucts are low (de Benoist, 2008). Creature source nourishments are the foremost common wellspring of Vitamin B12, so insufficiency is pervasive when the admission of these food sources is low because of their significant expense, absence of accessibility, or social or strict convictions. Nutrient B12 deficiency is surely increasingly common in exacting vegetarians (de Benoist, 2008).

In our study, out of 200 anaemic adolescents, 137 anaemic adolescents took a vegetarian diet, and 63 anaemic adolescents took a mixed diet. In Nagar Parishad school among 100 anaemic adolescents, 66 anaemic adolescents took a vegetarian diet, and 34 anaemic adolescents took diverse food. Whereas in private school among 100 anaemic adolescents, 71 anaemic adolescents took vegetarian diet and 29 anaemic adolescents took a mixed diet.

BMI categories of study participants

In our study there are more number of the anaemic adolescent with average weight this could be due to the participants are healthy school-going adolescents.

In the study conducted by Thomas *et al.* (2015), when anaemic adolescents were assessed for nutritional status by assessing BMI, it was found that 54% were in the normal range of BMI, 27.5% were very underweight, 17.5 % were underweight, and only 1% were overweight. Dhuppar *et al.* (2017) studied 501 school going adolescent girls out of the 204 girls were anaemic, among them 125 had BMI below 18.5, 74 had BMI between 18.5-25 and 5 had BMI between 25.1-29.

CONCLUSION

Prevalence of anaemia in adolescent is a significant public health concern. Supplementation with not only iron and folic acid but also Vitamin B12 may be need of the day. Besides supplementation adequate education regarding quality food, cooking practices and health education is also necessary to be emphasized in adolescents.

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Conflict of Interest

We all the authors declare no conflict of interest.

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