



## An Analytical Study on Dietary Factor Influenced by Hemoglobin Levels for Sufficient Feeding Defective Marrow

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### ABSTRACT

According to WHO, the prevalence of anemia is highest in South Asia, and India has the maximum prevalence of anemia among the South Asian countries. Anemia is major concern in developing countries like India. Thus, the present study explored the dietary factors influencing hemoglobin levels among college students. Adopting stratified and simple random sampling technique, this study is showed at 3 Arts and Science Colleges situated in North Chennai. This study is directed among 1000 students in the age group of 19 to 22 years. Interview schedule was used for collection of the details regarding the background information and eating habits of the participants. Biochemical tests are the most objective and sensitive measures of nutritional status. In the present study, hemoglobin is evaluated using Drabkin Method. The attained particulars are oblique and arrived into Microsoft excel. The oblique raw data are exposed to numerical study utilizing Statistical Package for Social Science (SPSS) version 20.0. Hemoglobin levels of the participants were correlated with dietary habits. The prevalence of anemia was more among 19 years (73.4%), followed by 65% in 20 years, 54.6% in 21 years and 46% in 22 years. Hostel dwellers were more prone to anemia than the students resided with the parents, friends and relatives. Students residing at hostel tend to have a poor eating habit leading to low hemoglobin levels. Vegetarians are more prone to anemia when compared to mixed diet consumers and ova- vegetarians.



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### INTRODUCTION

Anemia is a ubiquitous but major public health issue that disturbs the quality of life as well as work capacity of a large population throughout the world. According to WHO, the prevalence of anemia is highest in South Asia, and India has the maximum prevalence of anemia among the South Asian countries. (Subramaniyan *et al.*, 2016) Studies showed in dissimilar areas of India showed that the occurrence of anemia was 52.5% in Madhya Pradesh, 37% in Gujarat, 41.1% in Karnataka, 85.4% in Maharashtra,

21.5% in Shimla, 56.3% in Uttar Pradesh, 77.33% in Andhra Pradesh, and 58.4% in Tamilnadu as well as in Kerala. (Siva *et al.*, 2016)

In India, anemia is of major concern in almost 50% of the existing population. The issue at hand gains importance as the percentage of women affects is significantly higher than men. Statistics indicate that about 20 to 40% of maternal deaths in India are due to anemia and roughly about one out of every two women (56%) suffer from some form of anemia. (Shill *et al.*, 2014) Studies have shown that a higher number of university level students, particularly females were anaemic who are further hard-pressed by wrong eating habits as well as lack of awareness. (Kaur *et al.*, 2017)

Anemia Causes adverse consequences as the disease progress. It affects not only the growth of adolescent girls but also their attentiveness, memory and school performance which play a role in attendance retention in school. It also causes suspension in the onset for menarche Furthermore influences safe framework prompting infections. In those weakness *adiantifolia* juvenile young lady gets to be pregnant, it might increment fetal horribleness and also mortality, the perinatal risk, the occurrence about easier conception Weight (LBW), Also might actuate an in general increment Previously, baby (IMR) What's more maternal mortal sin (MMR) rates. Similarly as developing pregnant youths contend for the developing embryo to nutrients, anele done pregnancy will be more awful over that On more seasoned ladies. (Gan *et al.*, 2011)

The major objective of nutrition plans is to achieve appropriate and essential nutrition to be physically prepared for a healthy life. To promote health at a society level, the multiple attitudes of the people it encompasses, must be taken into consideration. Selection of unhealthy foods, elevated costs of nutritionally healthy foods and cheaply priced, combined with easily available nature of fast foods may pose a negative impact on the eating habits of university students. (Misra *et al.*, 2011)

As stated by wellbeing and diet review Eventually Tom's perusing nourishment and medication Also organization (FDA), 2014 Just about 89% opted to secondary salt diet to India, to be specific that those lion's share for eating methodologies would veggie lover particularly rich done fruits, vegetables and pulses with secondary utilization from claiming sweets and snacks for couple of dishes Additionally holding meat. The normal snacks over india would Typically high-fat, high- salt singed nourishments that might additionally be helterskelter On trans-fats, and this might illustrate their associa-

tion for An number of separate wellbeing conclusions. (Aberoumand, 2009). In 2011, Gan indicated the association the middle of bad consuming practices and insufficient supplement admission complex Around college scholars. An investigation embraced done malaysia indicated that main 19% for people concentrating on over college devoured vegetables more than thrice consistently. Those examine also concluded the immediate need for making healthy food choices. Vegetable plants and fruit trees though occupying about 65% of cultivable terrain are consumed less frequently in India's general population. (Prabha and Mahaboob, 2015) According to the report of International Food Information Council Foundation 2015, almost 61%.

## MATERIALS AND METHODS

Those exploration configuration to those exhibit consider may be about test kind. In the display research, those tests are chose toward method for stratified inspecting also straightforward arbitrary examining systems. This ponder might have been led during three Expressions. Furthermore science universities arranged in north chennai (two legislature universities and more person administration helped college). This contemplate might have been led "around 1000 scholars in the age class from claiming 19 on 22 quite some time. The eagerness of the members on take an interest in the embraced consider might have been affirmed. Moral freedom might have been acquired starting with widespread morals panel (UEC) in the recent past beginning of the study. UEC reviewed the study methodology, interview form, data collection sheet, participant informed consent form, and rendered 'Full Board Approval' to conduct the study (Balasubramaniam and Malathi, 1992). Written consent to participate in the study was got from all of them.

The chose members who have consented on a chance to be an and only those examine were educated something like those examine What's more its importance Toward the specialist Along these lines that they might participate Also make conceivable On gathering the essential data to those ponder. After finishing the preliminary procedures including obtaining ethical clearance, permission from college authorities, and consent from selected study participants, data collection was started. Interview schedule was used for collection of the details regarding the background information and eating habits of the participants. Biochemical tests are the most objective and sensitive measures of nutritional status. In the present study, hemoglobin is evaluated using Drabkin Method. By following this method,

20 microliter of capillary blood was drawn from the participants in a sterile condition. To the 20 microliter of the whole blood sample, 5ml of Drabkin solution was added, and rinsed using the pipette 3-4 times with reagent. Further, it was mixed well and Permitted should stand for no less than 15 minutes at room temperature (18-26° C). Perusing Also recording the absorbance of each test versus the spotless Concerning illustration those reference In 530 nm to An spectrophotometer. (Babita, 2014) the got points were coded Also entered under Microsoft shine in Table 1. The oblique raw data are exposed to arithmetical examination utilizing Statistical Package for Social Science (SPSS) version 20.0. Hemoglobin levels of the participants were correlated with dietary habits.

## RESULTS AND DISCUSSION

In the present study, vegetarians are more prone to anemia when compared to mixed diet consumers and ova vegetarians in Figure 1. A study directed by Babitha presented that anemia is found more (82.5%) among vegetarians than the non-vegetarians (Rani and Baburao, 2017).

In the current study, prevalence of anemia was reported more among subjects who consumed junk foods one to three times per week (67.6%), followed by those who consumed four to six times per week (64.6%) and 60.6% among daily consumers. It is interesting to note that prevalence of anemia among rare and never consumers of junk foods is reported to be lower, that is 13% and 2.7% respectively in Table 2.

Poor people dietary design taken after Toward higher socioeconomic gathering for A greater amount of snacks Furthermore garbage foods, which way this absence micro supplements demonstrating those higher pervasiveness for anele "around them. (Siva et al., 2016) in Table 3.

The overhead table illustrated the correlations of hemoglobin with the selected iron rich foods. It is very well understood from the above tables that iron rich foods intake is found to be lower among the study group, which in turn has an effect on lower hemoglobin level.

Greens are inexpensive food and the richest source of iron. But unfortunately, the frequency of greens consumption seems to be very less in the study, which has a strong impact on lower hemoglobin level, it is also statistically important at ( $p < 0.001$ ). Our study is also supported with the study showed by Gurram Sudha Rani. (Riyadh et al., 2017) In that study, the respondents who never took green leafy

vegetables had more prevalence of anemia in both rural and urban areas than who consumed thrice or more per week.

Dhal, whole grains, and roasted bengal gram are loaded with protein. Dhals and whole grains contain around 3 to 5 milligrams per 100 gram and roasted bengal gram has 9.5 milligrams of iron. Globin is a protein present in hemoglobin, thus it is necessary to take protein rich foods to improve the iron status. As per this view, the protein-rich food intake is also found to be lesser, which is also a reason for lower hemoglobin status. It is also statistically important ( $p < 0.001$ ).

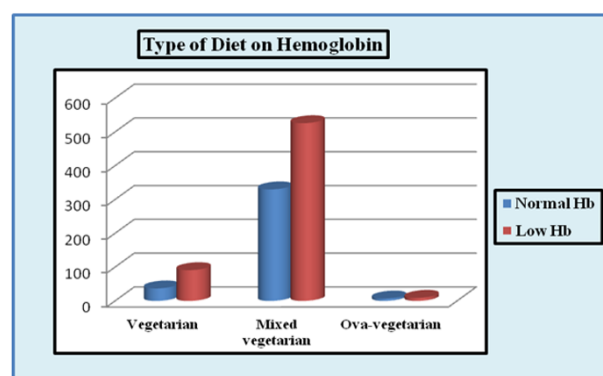


Figure 1: Type of hemoglobin

The millet bajra is loaded with iron (8 milligrams per 100 grams). In spite of the inexpensiveness and abundant nutritional property of bajra, it is not consumed frequently by the study group. The awareness among millet consumption needs to be improved to prevent micronutrient deficiencies. Bajra consumption is positively correlated with hemoglobin status ( $p < 0.001$ ). Pickles and dry fish are traditional preserved foods. They are reported to be preserved using salts. The higher salt intake reduces the iron absorption thereby reducing the hemoglobin which is also significant in our study with the correlation value of -519 and -362 respectively.

Coffee and tea consumption is reported to be in higher side in the present study. Tea and coffee contain antinutritional factors namely phytates/tannins and polyphenols which could inhibit iron absorption. It is evident that coffee/tea intake reduces iron absorption, thereby reducing the hemoglobin level among coffee/tea consumers. Frequent tea consumption was significantly related by an augmented risk of iron shortage anemia. (Has-sand, 2015) Significant iron captivation inhibitors are polyphenols (Gloyl groups), current in tea, coffee, and cocoa. (Arsenault et al., 2009)

Jaggery is a rich source of iron and potassium. But

**Table 1: Effect of type of Diet on Hemoglobin levels**

Type of Diet	Normal Hemoglobin	Low Hemoglobin	Total	Chi-square level	P-value
Vegetarian	37 (28.9) [9.9]	91 (71) [14.6]	128 (100) [12.8]	13.378	<0.001*
Mixed vegetarian	330 (38.6) [88.2]	526 (61.4) [84.4]	856 (85.6) [100]		
Ova vegetarian	7 (43.8) [1.9]	9 (56.2) [1.4]	16 (100) [1.6]		
Total	374 (37.4)	626 (62.6)	1000 (100)		

**Table 2: Frequency of Junk foods consumption on Hemoglobin level**

Frequency of Junk foods	Normal Hemoglobin	Low Hemoglobin	Total	Chi-square level	P-value
Daily	63 (39.4) [16.8]	97 (60.6) [15.5]	160 (100) [16]	13.378	0.037*
4-6 times per week	83 (35.3) [22.1]	152 (64.6) [24.3]	235 (100) [23.5]		
1-3 times per week	131 (32.3) [35]	274 (67.6) [43.7]	405 (100) [40.5]		
Rarely	74 (46.3) [19.7]	86 (53.7) [13.8]	160 (100) [16]		
Never	23 (57.5) [6.1]	17 (42.5) [2.7]	40 (100) [4]		
Total	374 (37.4)	626 (62.6)	1000 (100)		

it is evident from the present study that only 0.7% consumes it daily. The overall jaggery consumption is less in our study. Low jaggery consumption has a positive correlation by low hemoglobin level which is statistically important ( $p < 0.001$ ). Fruits are rich source of vitamin A, vitamin C and micro minerals.

Vitamin C essential for iron absorption. Fruits namely amla, guava, orange, lemon and pineapple are rich in vitamin C. In our study fruits consumption is lower among all the participants (0.3 % and 1.1% consume fruits daily and alternate days), which shows vitamin C deficiency is one of the reasons for low hemoglobin.

Junk foods such as packet foods and biscuits are

loaded with calories, carbohydrates, and fat. It is deficient in protein and micro minerals especially iron. Our study also witnessed the higher and frequent consumption of junk foods and biscuits. When the students prefer to consume more junk foods then they reduce to eat iron rich healthy food. Thus, high junk food and biscuits consumption has a positive correlation and statistically significant at  $<0.001$  level.

The correlation coefficient of energy, protein, and vitamin C is originate to be .523, .439 and .222, correspondingly, which is statistically important. B complex vitamins such as B6, B12, and folic acid involved in hemoglobin production in Table 4.

**Table 3: Effect of Food Frequency on Hemoglobin level**

Food items	Correlation coefficient	P-value
Dhal	.193	<0.001**
Whole grams	.421	<0.001**
Roasted Bengal gram	.301	<0.001**
Greens	.456	<0.001**
Fruits	.301	<0.001**
Dry fish	-.362	<0.001**
Jaggery	.392	<0.001**
Packet foods	.251	<0.001**
Biscuits	-.076	<0.017**
Carbonated beverages	.291	<0.001**
Pickles	-.519	<0.001**
Coffee	-.225	<0.001**

**Table 4: Effect of Nutrients on Hemoglobin**

Nutrients	Correlation Coefficient	P-value
Calories	.523	<0.001**
Protein	.439	<0.001**
Iron	.721	<0.001**
Zinc	.717	<0.001**
Vitamin B1	.781	<0.001**
Vitamin B2	.757	<0.001**
Vitamin B12	.465	<0.001**
Folic acid	.612	<0.001**
Vitamin C	.222	<0.001**
Vitamin B3	.808	<0.001**
Vitamin B6	.469	<0.001**

These vitamins activate the enzymes to form haem. When these vitamins are deficient, hemoglobin levels reduce in the blood leading to anemia. In the current research, there was an inverse relationship between folic acid and vitamin B12 with hemoglobin concentration. Our study participants did not meet the RDA for folic acid and vitamin B12 and were deficient in mutually the vitamins. This clearly states that deficiency of folic acid and vitamin B12 leads to low hemoglobin level with the correlation coefficient value of .612 and .465 respectively. This is also statistically important ( $p < 0.001$ ). A absence of vitamin B12 or folic acid consequences in young red blood cells and a disorder named malicious anemia. A study conducted by Joanne Arsenault reported inverse association between serum folate and hemoglobin concentration. (Cole et al., 2010)

There was also a positive correlation between vitamin B1, B2, B3, and B6 by the hemoglobin levels. The correlation constant of Vitamins B1, B2, B3 and B6 were found to be .781, .757, .808, and .469 respectively. We also noted a statistically important suggestion among iron uptake and hemoglobin levels with the correlation value of 0.721. Deficit of iron leads to a low level of hemoglobin. Insufficient dietary iron admission complex Also insufficient admission complex about variables that encourage iron absorption can be recognized definitive to those event of Iron- insufficiency anele (IDA).

Zinc will be An great referred to co-factor of a few proteins done people and assumes An real part in the digestion system from claiming iron. Subsequently zinc insufficiency will be found on be connected with idaho. As stated by An investigation directed Toward conrad low serum zinc centralization ( $< 10.7 \mu\text{mol/L}$ ) might have been available for 34 (12%) children, What's more 37 (13%) were weakness adiantifolia (hemoglobin  $< 110 \text{ g/L}$ ). Serum zinc will be associated with hemoglobin ( $r = 0.24, p < 0.001$ ).

## CONCLUSIONS

The prevalence of anemia was more among 19 years (73.4%), followed by 65% in 20 years, 54.6% in 21 years and 46% in 22 years. Hostel dwellers were more prone to anemia than the students resided with the parents, friends and relatives. Students residing at hostel tend to have a poor eating habit leading to low hemoglobin levels. Vegetarians are more prone to anemia when compared to mixed diet consumers and ova- vegetarians. Lower consumption of greens, bajra, and roasted bengal gram and high intake of dry fish, pickles, and coffee showed low hemoglobin scores. Thus it is necessary for the college students to modify their eating habits accordingly to increase the hemoglobin levels. Food sources such as citrus fruits must be consumed along with iron food sources to increase the hemoglobin. Whereas caffeinated beverages, salty foods must be restricted which hinders the iron absorption. Spreading the Nutrition Education in this regard helps to increase the hemoglobin levels among the general population.

## Conflict of interest

The authors declare that they have no conflict of interest for this study.

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