

Hemogram indices of healthy lactovegetarian population from Tharparkar village.

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Abstract:

Introduction: The evidence of micro nutrients deficiencies related mortalities are emerging all over the globe. Lack of the knowledge of dietary source of vitamin D complex and iron affects the haemogram indices. Aim of this study was to assess the haemogram values of healthy lactovegetarian population of Tharparkar village and to correlate these with WHO parameters.

Methodology: This descriptive cross-sectional study was conducted in 2016-17 on 100 apparently healthy subjects of both genders with age 14 to 55 years. Peripheral smears were prepared using Leishman stain at the research field during sampling. Coagulated whole blood samples were collected and transported to the Dow university lab at Karachi under proper temperature.

Result: The mean age of the subjects in this study was 30.5 (± 8.3) and the male to female ratio was 2.1:1 the mean hemoglobin level was 13.5 (± 1.6). Mean NCV level was 83.6 (± 9.9) mean MCH was found as 63.9 (± 3.1). and mean Hematocrit was found as 40.4. (± 5.7)

Conclusion: The blood indices of lactovegetarian population of Tharparkar village fall within the specified range as set by WHO Parameters except MCV which was found higher than normal. This may be attributed to the deficiency of vitamin B12 or Folate.

Key word: Lacto-vegetarian, Hemogram indices, vitamin B12/Folate deficiency, Anemia.

Introduction:

District Tharparkar is one of the most neglected regions of Sind. This area has multiple problems e.g. poverty, lack of basic amenities, education and the religious customs which make this population vulnerable to anemia due to dietary deficiency. Anemia is defined as a clinical condition characterized by reduction in hemoglobin concentration below the normal for the age, sex, physiological condition and altitude above the sea level¹. It is a global problem, mainly affecting poor people in the developing countries². The pregnant and lactating females, growing children and elderly people are at higher risk of nutritional deficiencies of these micronutrients and vitamins as compared to other groups of population. Vitamin E is one of the essential vitamins which are mostly present in animal food sources & only in negligible amounts in the dairy products³. The strict vegetarians are at higher risk for the development of complications of its deficiency. The latter only presents as Anemia, but uncommon logical and psychological manifestation do occur. Anemia is a condition in which the number of red blood cells and consequently, their oxygen carrying capacity is insufficient to meet the physiologic needs of the body; specific physiologic needs vary with person's age, gender, diet, smoking behavior and different stages of pregnancy^{4,5}. Foliates are present in vegetables and animal products and deficiency usually present as macrocytic Anemia without systemic involvement⁶. The micronutrient deficiencies and their associated mortalities are very common worldwide. The people in general are unaware about the benefits of daily consumption of the vitamins and their dietary sources. This is due to many facts, for example low socioeconomic status, lack of

taking the balanced diet and social dietary traditions such as consuming a low caloric diet.

A vegetarian diet and its many forms, such as lacto and/or ovo-vegetarian, or vegan, can easily meet all nutritional requirements, though there are certain considerations to monitor when eating a plant-based diet to ensure access to all essential vitamins, minerals and fatty acids. A vegetarian diet, like any diet, could pose a risk of deficiency if the proper food groups are not consumed. The good news is that the foundation of vegetarian diets is fruits, vegetables, whole grains and legumes; which are all full of diverse health y nutrients. Studies show that appropriately planted vegetarian diets are healthy and appropriate for all age groups and populations. In this article, the term "vegetarian" will be used as an umbrella term for the many types of plant-based diets⁷.

Lacto-ova vegetarians typically consume eggs and dairy products in addition to plant-based foods, such as fruits, vegetables, whole grains, legumes, nuts, seeds and soy products. Key nutrients for vegetarians include omega-6 fatty acids, protein, iron, zinc, iodine, calcium and vitamins B-E and D. Although these nutrients are important for vegetarians, lacto-ovo vegetarians who consume plenty of dairy products and eggs generally get adequate amounts of protein, calcium, iodine and vitamins B-E and D as compared to lactovegetarian. In this study, we analyzed the hemogram indices to assess the deficiency of the vitamins B12 and folate in only lactovegetarians.

Methodology:

This descriptive cross-sectional study was conducted on n = 100 lactovegetarian apparently healthy subjects of both genders, in rural area of

Tharparkar in 2006. The study was conducted after an ethical approval from the ethical committee of the Dow University. Subjects were introduced about this project at a local assembly place. An informed consent was taken before enrolling the participants in the study. The literacy rate in this population was 35 % so we explained the project well to the uneducated ones and got a thumb impression on the consent. Apparently healthy lacto vegetarian subjects aged between 14 and 55 year were included while the subjects who were taking multivitamin preparation orally or parentally, history of blood transfusion, history of diarrhea and worm infestation age less than 14 year were excluded from study. After taking aseptic measures anticoagulated whole blood samples were collected for assessing multiple parameters of blood i.e. complete blood count (RBC), hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), Red cell distribution width (RDW) and platelet count. Peripheral blood smear was made at the research field site and fixed with 50% methanol, so that cellular morphology could be maintained. The sample slides and tubes were coded with the subject's serial numbers and full names. After collection of required quantity, the samples were put in the box having 4 °C temperature. Samples were safely transported within 8-10 hours to Dow Diagnostic Research Laboratory Karachi for analysis using an automated cell counter TAC –alpha (5 parts). Out of the opted 18 parameters, XBC Hemogram was obtained comprising of WBC, RBC, hemoglobin, hematocrit, MCV, MCH, MCHC, platelet count and white cell distribution width. The peripheral blood smear was stained with Leishman stain. Peripheral smear morphology was reported by using conventional microscopy. The references range for both genders were used in accordance to the WHO guidelines. For morphology, normochromic normocytic picture was considered as non-anemic. Hypochromia with poikilocytosis and anisocytosis as either iron deficiency or haemoglobinopathy or both; while macrocytosis was taken as vitamin B12 or folic acid deficiency anemia. Out of two approaches i.e. kinetic (focusing on production, destruction and loss) and morphological (based on RBC size); the latter was used as conventionally done by routine hematology analyzer.

Results:

The mean age group of n = 100 subjects from a Tharparkar village in this study was found to be 30.5 (±8.3). It comprised of 78 male and 32 female participants with a male to female ratio as 2.1:1 in this population. Common symptoms

found in the participants were: complain of weakness and fatigue 54 %, dyspnea 30 %, vertigo 13% and dyspepsia 14 %. The normocytic normochromic morphology was found in 79 %, macrocytic in 17 % and anisocytosis hypochromo-microcytic features in 04%. Gender wise, 4 (5.8 %) males out of 68 were found to be mildly anemic with hemoglobin of 10g% as opposed to 5 (15.6%) females out of 32 who has anemia with hemoglobin ranging below 8gm/dl. Anemia was found in 09 of the 100 participants of this study. The mean hemoglobin level was 13.5 (±1.6). Gender wise, the mean haemoglobin level in male was 14.4 (± 0.9) and in females 12.0 (±1.0) (Table-1, Figure- 1). Mean MCV was 93.6 (±9.9). Gender wise the mean MCV was more in males i.e. 95.6 (± 9.1) than in females 89.5 (±10.5). The mean MCHC was found as 33.9 (±3.1), mean MCH was found 31.7 (±3.8) (Table-1 Figure- 2).

Discussion:

The lacto vegetarian population in a relatively impoverished area with scanty food supplies is exposed to disturbed blood profiles attributed to the deficiency of vitamins. This study was conducted to have a snapshot of the blood indices in such a population to observe the differences from the normal values as given by WHO. Many factors influence the hematological parameters such as age, gender, dietary habits, geographic location, season and genetic disease^{7,8}. In this study population, being a strict lactovegetarian excludes animal sources of iron, vitamin E and folic acid from the diet⁸. However this factor was constant for all the participants of the study.

The MCV parameters are influenced by several factors ranging from constitutional abnormalities of hemoglobin synthesis like sickle cell anemia, alpha or beta thalassemia to modifiable factors like dietary deficiency of iron^{9,10}. This study had participants from a socioeconomically poor class with inadequate availability of food supplements or multivitamins.

Apart from non-modifiable factors such as female sex, genetic predisposition and age, there are potentially preventable risk factors leading to anemia¹¹⁻¹³. The most important of these is a balanced diet. Adequate food supplementation with iron and micronutrients can prevent anemia and the track of shortcoming can be prevented.

In our study only 04 (5.8 %) males and 05 (15.6%) females had anemia with low hemoglobin level as given by WHO level. Mean hemoglobin level was found 13.5 (±1.6) gm/dl. This finding match with the study conducted by Obeid and his Co-worker in 2002¹⁵. However, confounding factors like folate levels, serum ferritin level of the

participants was not done in case of our present study to assess the hemogram indices of the subjects residing in district Tharparkar in general. There is a lack of understanding and resources in this population and more work must be done to improve health status of these subjects. MCV is the most sensitive index in diagnosis of vitamin B12 and folate deficiency¹⁶. In our study there was slight evidence of early changes in RBC morphology, we found that mean MCV was 93.7 (± 9.9). Maximum range was found 118 fl. The most probable cause of border line increase in MCV in vegetarians is vitamin B12 or folate deficiency¹⁶. There is discrepancy among lab regarding upper limit of MCV and also different communities have different upper limits of MCV¹⁷. In our study the mean value MCH, MCHC and Hematocrit Fall within the normal range as set by WHO Shown in chart.

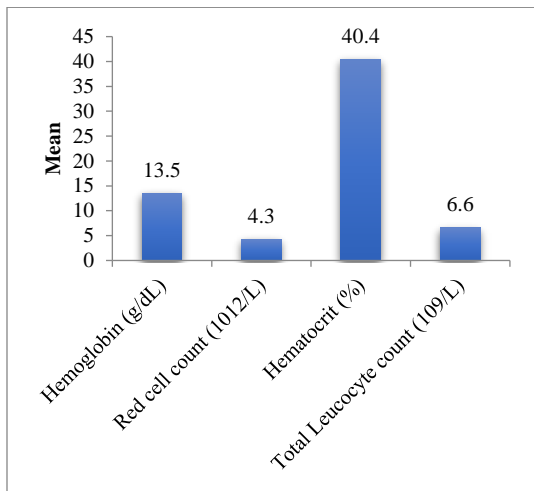


Figure- 1 Descriptive statistical analysis of Hemoglobin, RBC, Hematocrit and TLC in lacto vegetarian subjects (18-55 years, n-100) from a Tharparkar village

Conclusion:

It is concluded that the blood indices of Lacto vegetarian population of Tharparkar village fall within the specified range as set by WHO, except MCV which is found higher than normal which may be because of deficient Vitamin B12/Folate levels. It is recommended that further studies are recommended to find out the real cause of this finding.

Table 1. Descriptive statistical analysis of Lactovegetarian

HEMOGRAM INDICES (n=100)	Levels (\pm SD)
Hemoglobin (g/dL)	13.5 \pm 1.6
Red cell count (10 ¹² /L)	4.3 \pm 0.8
Hematocrit (%)	40.4 \pm 5.7
Mean corpuscular volume (fL)	93.6 \pm 9.9
Mean corpuscular hemoglobin (pg)	31.7 \pm 3.8
Mean corpuscular hemoglobin concentration (g/dL)	31.9 \pm 1.3
Total Leucocyte count (10 ⁹ /L)	6.6 \pm 5.4

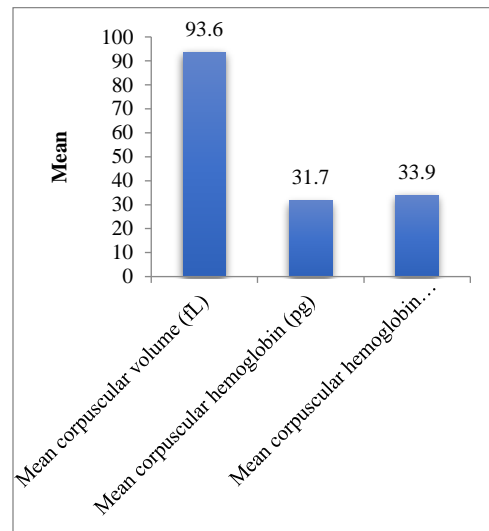


Figure- 2 Descriptive statistical analysis of MCV, MCH and MCHC in lactovegetarian subjects (18-55 years, n -100) from a Tharparkar village.

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