



## Evaluation of Incidence and Pattern of Anaemia in a Tertiary Care Hospital in Navi Mumbai

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### ABSTRACT

**Background:** Anaemia, being an important global health problem, affects both underdeveloped and affluent countries leading to severe impact on human health and social and economic development. The present study is to analyze the data present in the haematology laboratory of a tertiary care hospital to determine the overall incidence and pattern of anaemia, which is a novel exercise, first of its kind in Navi Mumbai region in Maharashtra, India, that would essentially facilitate devising of clinical trials for its management and establishing comprehensive mechanisms to improve health care at community level for its prevention.

**Objectives:** The objective of the present study is to assess the incidence and pattern of anaemia by analyzing the haematology data available in the haematology laboratory of a tertiary care hospital.

**Methods:** The design of the present study is to analyze the available data in the haematology laboratory of a tertiary care hospital to determine incidence and pattern of anaemia.

**Results:** In the present study, a total of 563 (3.19%) cases of anaemia are diagnosed after analysis of routine haematological reports of blood samples received in the central laboratory of a tertiary care hospital. Out of 563 cases of anaemia, 278 (49.37%) cases are diagnosed in males and 285 (50.63%) cases in females. In the present study, the number of anaemia cases in children below twelve years of age is 101 (17.94%) and in adults and adolescents it is 462 (82.06%) cases. The age-wise incidence of anaemia is highest, 248 (44.04%) cases, in the age group of 12 to 40 years, while it is least, 26 (4.4%) cases, in infants under the age of one year. The present study of characterization of anaemia revealed maximum incidence of Dimorphic/normocytic normochromic anaemia of 261 cases (46.35%) followed by microcytic hypochromic anaemia, 250 cases (44.04%), while the incidence of Macrocytic anaemia is 37 (6.5%) cases and the number of thalassaemia cases diagnosed in the current study is 15 (2.66%).

**KEYWORDS :** Anaemia, pattern of anaemia, Incidence, Navi Mumbai

### INTRODUCTION

Anaemia is one of the most prevalent health problems worldwide and much more so in developing countries. Due to high incidence of anaemia and its consequent impact on health of large sections of the population all over the world, it has been recognized as a major health problem by most of the countries across the world. According to the World Health Organization (WHO) criteria, anaemia is defined as hemoglobin concentration below 130 g/L for men and below 120 g/L for women<sup>[1]</sup>. According to WHO, the global prevalence of anaemia is still unacceptably high and is estimated to be 24.8%, and it means that around 1.62 billion people in world are suffering from anaemia.<sup>[2]</sup>All strata of the population are affected by anaemia, though the prevalence worldwide happens to be much more common in women and children. In India, according to National Family Health Survey (NFHS-3) conducted in 2005-2006, anaemia has been found to be a serious health problem as its prevalence is 70% in the age group of 6-59 months, 55% in females between 15-49 years and 24% in males between 15-49 years.<sup>[3]</sup>Anaemia occurs due to many causes and for the simplicity of understanding, these causes have been classified into nutritional and non-nutritional causes. Nutritional causes include nutritional deficiencies such as deficiency of mainly iron, vitamin B12 and folic acid, while non-nutritional causes include blood loss which could be acute blood loss or chronic blood loss over a period of time due to primary bleeding disorders or as a result of gynaecological and gastrointestinal disorders leading to chronic blood loss; chronic infections or chronic diseases; hemolytic anaemias

due to hereditary or acquired causes, bone marrow disorders due to toxic effects of drugs or other myelophthitic bone marrow disorders, and chronic kidney disorders and so on.<sup>[4]</sup> Among anaemias arising out of all etiological factors, iron-deficiency anaemia is the most common type of anaemia. Iron deficiency may occur as a result of dietary deficiency or increased demand for iron during pregnancy, lactation, childhood and adolescence or it may be due to acute or chronic blood loss due to genitourinary or gastrointestinal disorders and malabsorption syndromes, parasitic infections and gastro-intestinal surgeries. Anaemia may be mild, moderate and severe depending on blood haemoglobin levels. Demographic and Health Surveys (DHS), a premiere data collection and technical assistance providing network funded by United States Agency for International Development (USAID), defines mild anaemia when the haemoglobin levels correspond to 10-10.9g/dl in pregnant women and children under 5 years of age and 10-11.9g/dl in non-pregnant women and adult males, moderate anaemia when haemoglobin level varies between 7-9.9g/dl and severe anaemia when haemoglobin value is below 7g/dl.<sup>[5]</sup>Anaemia varies in its intensity with clinical manifestations which may be severe and physically incapacitating as in case of severe anaemia when the haemoglobin levels are below 7g/dl, while in most of the individuals with mild anaemia clinical manifestation may not be overtly expressed in most Indians with haemoglobin level varying between 10-11.9 g/dl. In view of paucity of epidemiological data on the incidence of anaemia in various parts of the country, this study is an attempt to determine the incidence and pattern of anaemia by analyzing the

haematological data in a tertiary care hospital in the peripheral part of Navi Mumbai which has a mix of semi-urban and rural population of very diverse ethnic and socio-economic backgrounds.

**MATERIAL AND METHODS**

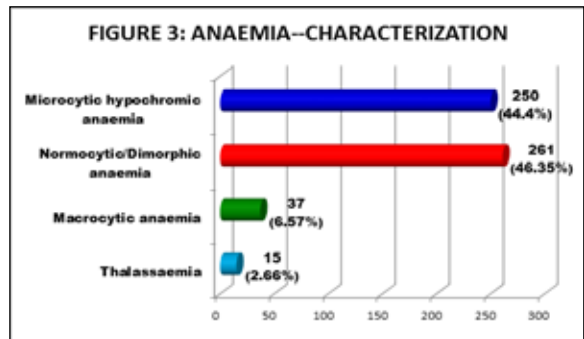
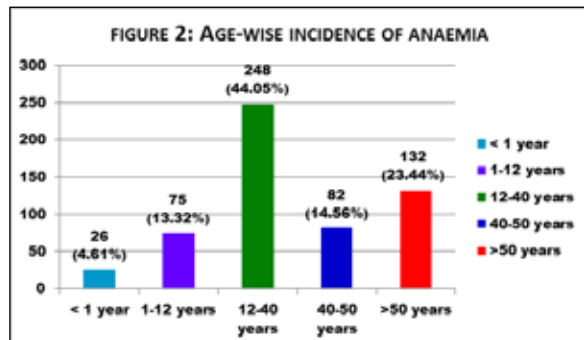
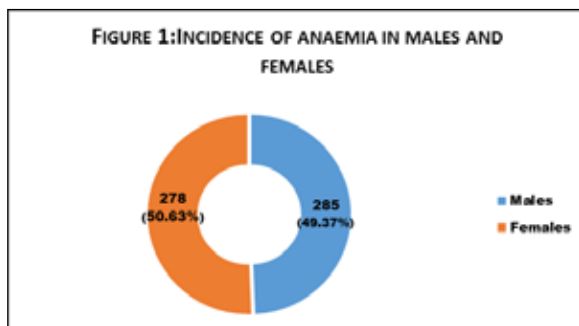
The present study is conducted by analyzing the haematological data of the blood samples received in the central laboratory of a tertiary care hospital in the peripheral part of Navi Mumbai in Maharashtra state of India, a geographical area of mixed semi-urban and rural population of divergent ethnic and socio-economic backgrounds. Between June 2015 and December 2015, a total of 20,000 blood samples were analyzed for routine haematological investigations such as complete blood count by using standardized automated blood cell counters. Out of these 20,000 blood samples, the laboratory results of 17,620 blood samples were included in the study as results of rest of the 2,380 blood samples were left out since these blood samples were found to be repeat haematological investigations of some of the patients, which are already included in the study. It is also found that wherever the blood samples were found to be improperly collected and the results of the blood samples were found to be ambiguous, repeat blood samples were collected to minimize the errors.

**RESULTS**

In the present study, routine haematological reports of 20,000 blood samples received between June 2015 and December 2015 in the central laboratory of a tertiary care hospital located in Navi Mumbai are analyzed. Out of 20,000 routine haematological reports, 2,380 haematological reports were left out of the study as they were found to be repeat investigations on some of the same patients which were already part of the study, and the total number of routine haematological findings such as complete blood count were analyzed on 17,620 blood samples received in the laboratory. The routine haematological findings were analyzed as per the World Health Organization (WHO) definitions and guidelines on anaemia.

In the present study, a total of 563 cases of anaemia are detected after analyzing the routine haematological reports such as complete blood count of 17,620 blood samples received in the central laboratory. Out of 563 cases of anaemia, 278 (49.37%) are males and 285 (50.63%) are females (Figure 1). Among the females with anaemia, females belonging to reproductive age-group of 18-35 years comprised 78 (27.36%) cases. Among 563 cases of anaemia, 101 (17.9%) cases are diagnosed in children under twelve years of age, while 462 (82.06%) cases are found in adults. Out of a total of 101 cases of anaemia in children, 26 (4.6%) cases are diagnosed in infants under one year of age, while 75 (13.3%) cases are found in older children aged between one and twelve years. 248 (44.04%) cases are found in adolescents and adults in the age group of 12-40 years and 82 (14.5%) cases are found in patients in the age group of 40-50 years, while 132 (23.44%) cases are seen in patients above 50 years (Figure 2).

Among 563 cases of anaemia, 250 (44.4%) cases are diagnosed as microcytic hypochromic anaemia due to iron deficiency, while 37 (6.5%) cases are of macrocytic anaemia due to vitamin B12 and/or folic acid deficiency and 15 (2.6%) are diagnosed as thalassaemias (Figure 3). In the present study, most of the cases, 143 (25.3%), of anaemia are associated with infectious conditions of various kinds for which various investigations were being carried out, while 45 (7.9%) cases were associated with chronic renal diseases; 17 (3%) cases were associated with various types of malignancy, out of which 5 (0.8%) were leukemias. Rest of the 358 (63.5%) cases were not associated with any specific pathological conditions.



**DISCUSSION**

In the present study, out of 17,620 cases of which haematological data are analyzed, a total of 563 cases of anaemia are diagnosed. The overall incidence of anaemia in the present study is found to be 563 (3.19%) cases. In a study conducted in Serbia,<sup>61</sup> the incidence of anaemia in adult population was 7.7%. The systematic analysis of global burden of anaemia by Nicholas J. Kassebaum<sup>72</sup> et al showed an incidence of anaemia of 32.9%. In the current study, anaemia was diagnosed in 278 (49.37%) males and 285 (50.63%) females, which is almost similar to the incidence of anaemia in males and females as 44.3% and 50% respectively, found in a study conducted in rural areas of north India by Malhotra et al<sup>81</sup>. In the present study, the highest incidence of 248 (44.04%) cases is seen in the age-group of 12-40 years, while the lowest incidence 26 (4.61%) cases is found in children under one year of age. According to a study<sup>91</sup> on prevalence of anaemia in rural population of Madhya Pradesh, a central Indian state, the maximum incidence of anaemia of 65.3% was found in the age-group of 11-40 years, which is higher compared to the incidence found in the similar age group as per the present study. In Ghana<sup>100</sup>, a west African nation, the incidence of anaemia in the age-group of under on year is 85.1%, while the incidence of anaemia in the same age-group is found to be 70.9% in a study by Rosemary Ferreira dos Santos<sup>111</sup> et al in Brazil, both of which are much higher than the incidence found in the present study (4.61%). The present study found 75 (13.35%) cases of anaemia in the age-group of 2-12 years and in a similar study by Amar Kumar Sinha<sup>122</sup>, the incidence of anaemia in the same age-group is found to be 24.4%. The number of cases of anaemia in the age-group of 40-50 years in the present study is 82 (14.56%) cases, which is almost similar to the incidence of 16.24% and 13.4% respectively found in the studies conducted by Parekh Alok and Verma Pratima et al.<sup>13, 141</sup> In the present study, 132 (23.44%) cases of anaemia are diagnosed in the age-group of above 50 years, which is higher than the incidence of anaemia (13.77%) found in the study carried out by Parekh Alok.<sup>131</sup>

In the present study, the characterization of anaemia showed that most of the patients, 261 (46.31%), were suffering from normocytic or dimorphic anaemia, an incidence which is almost similar, though the incidence is on the higher side, the incidence in a study conducted in Serbia by Jovanka Kolarovicet al,<sup>61</sup> which is 75%, while in the present study, the incidence of microcytic anaemia is 250 (44.4%) cases, which is much higher than in Serbian study, which varies from 22.2 to 35%. In a study conducted in Saudi Arabia<sup>151</sup>, the incidence of normocytic anaemia was 45.9% and that of microcytic anaemia was 54.1%, which is similar to the incidence found in the current study, though the incidence of microcytic hypochromic anaemia is slightly lower in the present determine. The study conducted by Zakiuddin et al<sup>161</sup>,

found highest incidence of 41.5% of microcytic hypochromic anaemia and the incidence of macrocytic anaemia was found to be 6% and that of normocytic normochromic anaemia/dimorphic anaemia was 20.5%, which have similarity of incidence of microcytic hypochromic anaemia and macrocytic anaemia, but the incidence of normocytic/dimorphic anaemia is much lower than the incidence observed in the present study. In another study conducted in Madhya Pradesh<sup>[17]</sup>, a state in central India, the incidence of microcytic hypochromic anaemia, normocytic normochromic anaemia and macrocytic anaemia were 55.53%, 28.1% and 12.16% respectively, and the incidence was on the higher side for microcytic hypochromic anaemia and macrocytic anaemia than the present study while normocytic normochromic anaemia showed a lower incidence.

## CONCLUSION

Anaemia is indeed a global health problem with its prevalence being higher in developing countries. There are no adequate data available regarding the incidence of anaemia in Navi Mumbai region of Maharashtra, India. In the present study, the overall incidence of anaemia in Navi Mumbai region is very low compared to the available data from studies conducted in other regions of the country and similarly available data from some other countries. The incidence of anaemia in males and females in the present study is almost similar to the incidence of anaemia elsewhere in the country, while the incidence of anaemia in children is lower in the present study compared to the data available on its incidence from different studies. The present study is a novel exercise, which is first of its kind to find out the overall incidence of anaemia and its characterization in the population of Navi Mumbai region, which would certainly help in evolving a comprehensive policy of management of anaemia.

## Conflict of interests

There are no conflict of interests whatsoever regarding publication of this article.

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