

*Full Length Research Paper*

# **Prevalence of iron deficiency in adult population: A case study from Khyber Pakhtunkhwa (KPK), Pakistan**

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**Iron deficiency (ID) is the most common cause of nutritional anaemia in world and it is recognized as a major public health problem throughout the globe, especially in the developing countries. Infants, young children and pregnant women are most frequently affected by iron deficiency, which is the most commonly form of nutritional deficiency. The aim of present study was to determine iron deficiency anaemia among adult population of Abbottabad, Khyber Pakhtunkhwa (KPK), Pakistan. A clear understanding of the risk factors in this population will help to plan for more effective strategies to control this nutritional deficiency. Among the selected anaemic patients, 72% were iron deficiency anaemic and 28% were non-iron deficiency anaemic. Iron deficiency anaemia was more common among females than males (82% patients were females and 18% were males). The risk factors were: pregnancy (57%), nutritional inadequacy (36%) and others (7%).**

**Key words:** Abbottabad, anaemia, iron deficiency, risk factors.

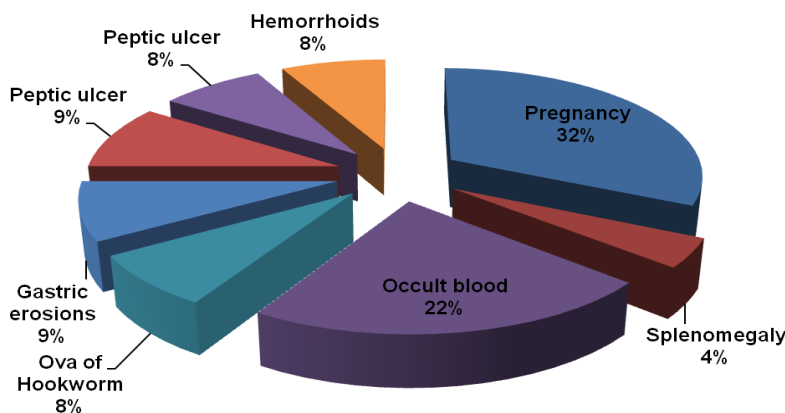
## **INTRODUCTION**

Iron deficiency (ID) is the most common form of nutritional deficiency. The size and number of red blood cells are reduced. There is a spectrum of iron deficiency ranging from iron depletion, which causes no physiological impairments, to iron-deficiency anemia, which affects the functioning of several organ systems. The terms anemia, iron deficiency and iron-deficiency anemia are often used interchangeably, but are not equivalent. Anemia can only be diagnosed as

iron-deficiency anemia when there is additional evidence of iron deficiency (Bagchi, 2004; Cook, 2005).

Iron deficiency is the most common cause of nutritional anaemia in the world, known as a major public health problem throughout the globe, especially in the developing countries. Infants, young children (Siti-Noor et al., 2006; Ali et al., 2011; Sherjil et al., 2010), adults (Paracha et al., 1997; Idris and Rehman 2005), menstruating women and in particular, pregnant women (Irshad, 2011; Rohra et al., 2008) are most often affected. Iron deficiency is a significant global problem. It is one of the major public health concern in preschool children and pregnant women in the developing countries. Many studies have examined these two at-risk groups; there is

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**Figure 1.** Iron deficiency anaemia analysis.

a paucity of data on anemia in preschool children living in developing countries (Siti-Noor, 2006). Iron deficiency anaemia during pregnancy has been associated with increased risk for low birth weight, preterm delivery and perinatal mortality. Iron deficiency is the commonest form of malnutrition worldwide and according to the World Health organization (WHO) affects 43% of the world's children (WHO, 2001). Deficiency may be due to inadequate dietary intake of iron, low level of absorption because of small bowel pathology, increased physiological requirements during rapid growth in infancy and adolescence and chronic blood loss usually from the gastrointestinal or urinary tracts or because of menorrhagia in adolescent girls (WHO, 2001). We are facing the major problem of high population growth in Pakistan, like other developing countries. Resources are inadequate which badly affect the socio-economic development of the country as a whole. Low literacy rate, poor hygiene, sanitation and limited health care, are the key problems leading to a variety of nutritional deficiencies, including iron deficiency.

The aim of this study is to determine the risk factors for iron deficiency anaemia (IdA) among adult population of Abbottabad. A clear understanding of risk factors in this population will help to plan for more effective strategies to control this nutritional deficiency.

#### METHODOLOGY

Both male and female anaemic adult patients (from January 2010 to 2011) who were admitted/visited the Ayub Medical Complex Abbottabad (AMC), were requested to participate in this study. AMC is the largest hospital in the region, most well-known by low socio-economic families. This hospital serves more than 80% of the population; therefore, selected for the study. The study included adults whose hemoglobin level was less than 12 g/dl for males and less than 11 g/dl for females. In each case, clinical history was recorded and the symptoms suggestive of anaemia in general and of iron deficiency anaemia in particular were carefully noted. To get

a clue about the cause of the symptoms, related questions were asked. A thorough physical examination was done, so as the positive findings were collected. Signs of anaemia, especially iron deficiency anaemia, were particularly looked for. Any sign giving an indication about the underlying pathology was carefully observed and noted. The investigations performed were: hemoglobin concentration, red cell indices: mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration, (MCHC), serum ferritin (SF), serum iron (SI) and serum total iron binding capacity (TIBC). The blood hemoglobin concentration was done in all cases as a screening investigation for anaemia. All patients with hemoglobin less than 12 g/dl in males and less than 11g/dl in the females were labeled as "anemic" and were included in this study. Then, the "anemic" patients were subjected to red cell indices (MCV and MCHC). These were labeled as "iron deficient anemic" whose red cell indices decreased below the standard levels and showing a microcytic hypo-chromic picture on peripheral blood film. On the other hand, the patients whose red cell indices were in the normal range or above the normal range and the peripheral film that was not in favor of iron deficiency were labeled "non-iron deficient anemic" and were not considered for further investigations. Iron deficiency state was confirmed in patients labeled as "iron deficient anemic" by the assessment of serum ferritin. These patients were then further investigated to find a cause for the iron deficiency anaemia.

#### RESULTS AND DISCUSSION

After careful selection, the suspected anaemic patients were subjected to red cell indices (MCV and MCHC). In 72% patients, red cell indices were below the normal ranges. These patients were labeled as "iron deficient anemic" while 28% patients showed erythroid hyperplasia. Iron deficiency anaemia was much more common among females than males as 82% were females and only 18% were males. It was found to be general in the age group of 25 to 50 years in both sexes. It was mostly a problem of the poor socio-economic class as 81% belonged to the lower socio-economic class, 16% belonged to the middle class families, while only 3% were members of upper class families (Figures 1 and 2). The

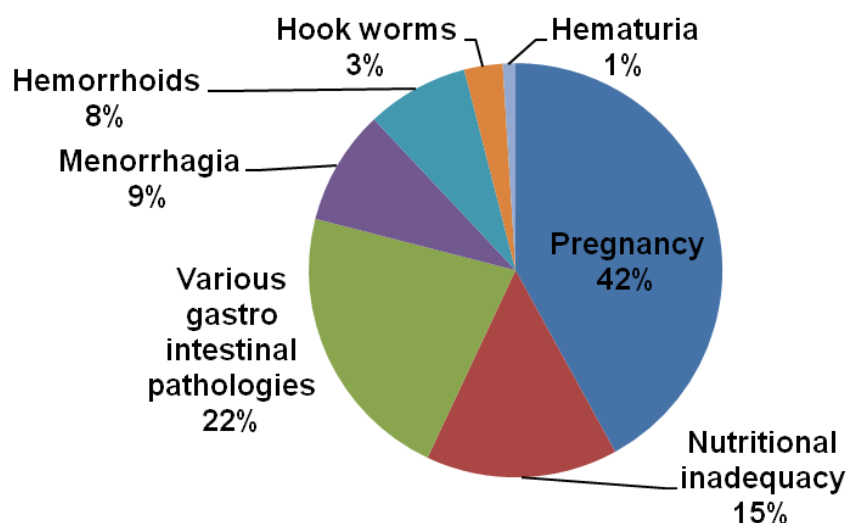


Figure 2. Iron deficiency anaemia risk factors

hemoglobin level was the most important among the investigations, it was found to be in the range of 3.5 to 9 g/dl. Investigations performed in order to determine the cause of iron deficiency anaemia in these patients included abdominal ultra-sonography, stool examination for occult blood and urine analysis. Among the anemic patients, iron deficiency anaemia was found to be the most general type of anaemia during the period of January 2010 to January 2011, as 72% of the anemic patients were iron deficient while the rest 28% had anaemia due to other causes (Cook, 2005; Molla et al., 1992; Karim et al., 1994). It can thus be concluded from all these studies that IdA is the most general type of anaemia among the anemic population.

In this study, 82% of iron deficient anemic patients were females, thus, IdA was found to be much more common among females than males, especially in the child bearing age. The risk of iron deficiency increased at puberty, menstruation. Iron requirements markedly increase in the second and third trimesters of pregnancy, because of high growth rates of fetus and placenta and the development of maternal red cell mass. Therefore, anaemia affects 50 to 70% of pregnant women in the developing countries (Irshad et al., 2011). Due to social customs, females get a diet of inferior quality as compared to that of males. Majority of the pregnant women do not get iron supplementation during pregnancy and lactation. For this reason, increased demands and decreased supply multiply the magnitude of the problem due to which IdA is so usually found among women of childbearing age. Obviously, females are more affected, because of the factors described earlier; females are prone to IdA in the reproductive age. Though, it is notable to find males as sufferers in the same age group. It is

most likely due to poor sanitation and poverty. They do not get adequate diet, yet work hard as laborers and as a result develop a number of nutritional deficiencies as well as iron deficiency. Poor sanitation makes them susceptible to parasitic infestations, particularly hookworm infection. Actually, 81% of the iron deficient cases support that this hypothesis belonged to the poor class; 16% to the middle class people, whereas only 3% were socially well off to be included in the upper class (Figures 1 and 2). The 3rd National Health and Nutrition Examination Survey conducted during 1988 to 1994 in USA also supports this fact, which exposed that the occurrence of iron deficiency is higher among children living at or below the poverty level than those living above the poverty level. Pregnancy was found to be the most general risk factor in 37% cases. In a number of studies, pregnancy was observed very frequent as IdA risk factor (Beard, 1994). In this study, nutritional inadequacy was found to be the second most general cause of iron deficiency anaemia. These patients did not have any associated disease, but belonged to very poor families in which typically there was a single bread earner for a large number of dependent family members. In 23% patients, gastric erosions were found; all of them had taken some form of non-steroidal anti-inflammatory drugs either on empty stomach or in improper dosage without consultation of the doctor. The trend of self-medication, especially for pain has increased, leading to increased incidence of epigastric discomfort and gastric erosions on prolonged use that finally causes iron deficiency anaemia. 5% patients were found to be infested by hookworm infection, which is one of the generalist causes of IdA worldwide. A study conducted in 1987, on children in Pakistan, that Pakistani children were deeply infested

(Khan et al., 1987). Studies have also shown that millions of wage earners undergo from this infection in Indo-Pakistan sub-continent, poor sanitation and living in unhygienic conditions due to poverty was the main reason.

## Conclusion

Conclusively, the prevalence of ID and IdA among adult population of Abbottabad, Khyber Pakhtunkhwa (KPK) is high compared to that in developed countries, and is mainly attributed to very low socioeconomic status. Medical personnel, particularly those working in primary health clinics, should have a low threshold for investigating and treating ID and appropriate dietary advice should be given to prevent this condition. In the patients in the region, iron deficiency anaemia is found to be a general problem. Majority of the iron deficient anemic patients are females; accordingly, it is concluded that iron deficiency anaemia is much more common among females, especially in the child bearing age than males. Iron deficiency anaemia is mostly a problem of the poor class as majority of the patients belong to very low socioeconomic status.

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