

## Prevalence of Anaemia in Children of Rural Areas of Punjab

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### ABSTRACT

Anaemia is one of the significant public health problem among children in the world especially in those who live in rural communities having low socioeconomic status. This cross sectional study was conducted to determine the prevalence of anaemia in children of rural communities of Punjab from January 2016 to July 2016. The children were selected from Services hospital, Lahore and District hospital Sharqpur, Dist. Sheikhpura. A total of 500 samples of children were collected. Questionnaire was designed to collect information for studying variables regarding age, gender, father's occupation, parent's education, child's family income etc. Their blood samples were collected and analyzed to find out the level of Haemoglobin, RBC's, WBC's, platelets, MCV, MCH and haematocrit specifically. Statistical analysis was done by using SPSS (version 13). Among the 500 subjects, according to haemoglobin level 130 subjects (26%) were normal whereas 370 (74%) were anaemic. It was found that 120 (24%) were mild anaemic, 151 subjects (30%) were moderate anaemic, and 99 subjects (20%) were severely anaemic. It has been concluded that the prevalence of anaemia was considerably high in children below the age of 12 years living in rural communities. It has been concluded that haematological parameters were greatly altered in anaemic patients.

**Key Words:** Anaemia, Children, Risk factors, rural areas

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### INTRODUCTION

Anaemia is one of the most serious public health problems affecting people living in developing and industrialized countries. It is one of micronutrient's deficiency which has serious public health consequence in the world (Aikawa *et al.*, 2006). Anaemia can occur at anytime and at all stages of the lifecycle but young children and pregnant women are at greater risk (Woldie *et al.*, 2015). Like other developing countries, Pakistan is also facing a problem of high population growth and limited resources which affects socioeconomic development in the country (Parvez *et al.*, 1997; Grant *et al.*, 1995). Anaemia is usually defined as a reduction in haemoglobin concentration and haematocrit, or the number of circulating red blood cells below that is considered normal (Nestel, 2002)

Anaemia has been shown to be a public health problem that affects low, middle and high income countries. Anaemia can occur due to nutritional and non-nutritional factors. There is different classifications of anaemia which include nutritional anaemia, anaemia of infection, anaemia of chronic diseases and pernicious anaemia (Mary

*et al.*, 2005). The most common and prevalent cause of anaemia is an iron deficiency; however, the condition may also be caused by deficiencies in folate, vitamin B<sub>12</sub> and protein. Some condition of anaemia is not caused by nutritional factors; other factors can be parasitic diseases such as malaria and congenital factors (Sowunmi *et al.*, 2010).

Approximately 50% cases of anaemia are considered to be due to iron deficiency. Iron deficiency anaemia (IDA) affects 43% of preschool children all over the world especially in developing countries, which shows that prevalence rates four times higher than those found in industrialized countries. This high prevalence is associated with some conditions like poor sanitation conditions, low socioeconomic conditions and high morbidity among infants (Finch, 1977;)

A risk factor is an element linked to a person, a behavior, lifestyle or environment that increases the chance of developing the condition and has been found correlated with the condition in epidemiological studies. Some of the factors that are found to be associated with both anaemia and poor cognitive development are low socioeconomic status, poverty, lack of stimulation in the home, lack

of maternal warmth; poor maternal education and intelligence, maternal depression, low birth weight (<2.5 kg), parasitic infection, elevated blood lead levels and under nutrition. Our goal is to evaluate the prevalence of anaemia in children  $\leq 12$  years of age living in rural communities and identify its associated factors in children.

## MATERIALS AND METHODS

### Study Design and Population

The present cross sectional study was designed to investigate the prevalence of anaemia in children of rural areas of Punjab. The study was carried out at Services Hospital, Lahore which is a tertiary care hospital and Tehsil Head quarter, hospital Sharqpur, Sheikhpura. Services hospital is a tertiary care hospital and subjects from nearby rural area visited. Subjects were assessed via personal interview. So, a total of 500 samples were collected from those children who belonged to rural communities. Questionnaire was framed to collect information regarding age, gender, father's occupation, parent's education, socioeconomic status, family history of anaemia, lifestyle, duration of breastfeeding and consumption (frequency and amount) of animal meat, fish, and other traditional foodstuffs.

### Inclusion criteria

All children of age 1 month to 12 years admitted in children ward were included in the study and it was made sure that all the children of either gender should be  $\leq 12$  years of age.

### Exclusion criteria

Children were excluded if they were chronic / seriously ill and who were above 12 years of age and had any other disease.

### Laboratory measurement

Blood samples were collected in EDTA tubes and the samples were immediately run on haematological analyzer (Model 'KX-21 Sysmex', Germany) to assess various parameters including WBC (White Blood Cells) count, RBC (Red Blood Cells) count, Hgb (Haemoglobin) concentration, Hct (Haematocrit), MCV (Mean corpuscular volume), mean corpuscular haemoglobin (MCH), and platelet count (PLT).

### Statistical analysis

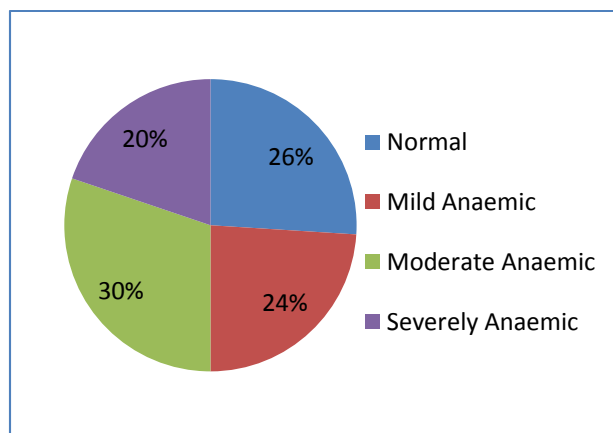
The data of all the subjects was entered on MS excel work sheet. Furthermore the tables and graphs showing the results were also made on MS

excel work sheet. The statistical analysis was then conducted on the data using statistical software packages SPSS version 13.0 for window. Demographic data was presented as mean  $\pm$  S.E.M. F-test was used for comparison of numerical data. Prevalence was determined by percentage.

## RESULTS

This cross sectional study was designed to investigate the prevalence of anemia in children of rural areas of Punjab. The major risk factors found in our research were parent's education (11%), lack of breast feeding (20%), low family income (23%), use of cow's milk (25%), irregular heart beat (9%), use of unboiled water and obesity (12%). They are suspected to increase the chances for development of anaemia in children.

Among the 500 subjects, according to haemoglobin level 130 subjects (26%) were normal whereas 370 (74%) were anaemic. The anaemic subjects were further categorized on the basis of severity of anaemia. 120 (24%) children were mild anaemic, 151 (30%) were moderate anaemic and 99 (20%) children were severe anaemic (Fig., 1)



**Fig: 1.** Prevalence of different categories of Anaemia

When 500 samples of children were categorized according to age as presented in table I. It was found that out of 500 samples 29% children were anaemic who were  $>1$  year in age. In our study population 50% children were anaemic who were in between 1-6 years of age. Children in between the age of 6-12 years were 21% anaemic.

**Table I: Prevalence of anaemia in children of different age group**

Sr. No	Age groups	Anaemic n (%)	Not anaemic n (%)	Total n (%)
1	>1 year	130(29%)	5(10%)	135(27%)
2	1-6 years	227(50%)	18(40%)	245(49%)
3	6-12 years	97(21%)	23(50%)	120(24%)
4	Total	454	46	500

#### Assessment of haematological parameters in different categories of anemic subjects

Different haematological parameters were assessed and presented in table II which shows that

they were altered in anaemic patients. The average values of Haemoglobin, RBCs, WBCs, PLT, Hct, MCV, MCH found in various group are given in table II.

**Table II: Mean of Haematological parameters in anaemic subjects**

Sr. No	HEMATOLOGICAL PARAMETERS	MILD (n=149)	MODERATE (n=168)	SEVERE (n=137)	F-value
1	RBC count ( $10^6/\mu\text{L}$ )	4.61 $\pm$ 0.1	4.13 $\pm$ 0.1	4.51 $\pm$ 0.1	0.429 <sup>NS</sup>
2	WBC count ( $10^3/\mu\text{L}$ )	18.0 $\pm$ 1.0	14.4 $\pm$ 1.0	13.7 $\pm$ 1.0	0.203 <sup>NS</sup>
3	PLT count ( $10^3/\mu\text{L}$ )	343.1 $\pm$ 11.4	411.7 $\pm$ 11.4	335.7 $\pm$ 11.4	0.026*
4	Hematocrit %	29.6 $\pm$ 0.4	27.8 $\pm$ 0.4	25.3 $\pm$ 0.4	0.001*
5	HGB (g/dl)	10.2 $\pm$ 0.1	8.65 $\pm$ 0.1	5.99 $\pm$ 0.1	0.000*
6	MCV (fL)	67.7 $\pm$ 0.6	69.7 $\pm$ 0.6	65.7 $\pm$ 0.6	0.061 <sup>NS</sup>
7	MCH (pg)	24.8 $\pm$ 0.5	22.9 $\pm$ 0.5	23.0 $\pm$ 0.5	0.267 <sup>NS</sup>

\*Significance at  $p \leq 0.05$

\*\*Significance at  $p \leq 0.01$

## DISCUSSION

The present study addressed the high prevalence of anaemia in children and influence of different factors on anaemic patients which are suspected to increase the chance for development of anaemia in children living in rural communities. It is common among school age children and children living in rural areas as our study support this. The prevalence of anaemia in this study was 74%. This rate is relatively higher than that obtained by Asobayire *et al.*, 2001 in children with the same age group (46 %). This could be explained by the fact that the study was extended to the rural population with different demographic characteristics.

In this study among 500 subjects, 130 subjects (26%) were normal whereas 370 (74%) were anaemic. By following the criteria of WHO (2008) it was found that 120 (24%) were mild anaemic, 151 subjects (30%) were moderate anaemic, and 99 subjects (20%) were severely anaemic. Similar study was conducted by Mazher.,

2015 in which total of 450 girls were studied and among these 43% subjects were severely anemic and a majority out of these (36%) belonged to low and middle income class. 28% were mild anaemic, 24% were moderate anaemic and 5% were normal. But in present study 26% were normal where as in her study 5% were normal the difference may be because of age group and gender as in our study both gender were enrolled and age group is less than 12 years. Another study conducted by Sop *et al.*, 2015 the overall prevalence of anemia was 66.67%. Among these children, 5.08 %, 22.60 % and 36.16 % were suffering from severe, moderate and mild anemia respectively.

In this study besides Haemoglobin (Hb), other haematological parameters were also measured like red blood cell (RBC), haematocrit (HCT), packed cell volume (MCV), mean corpuscular haemoglobin (MCH)), mean platelet volume (MPV), platelet, and white blood cell (WBC) and were compared among different categories of anaemia. Significant difference was observed in PLT, Haematocrit and Hb levels. Whereas Mujib *et*

*al.*, 2014 studied complete blood count in iron deficient anaemic children and he compared the sex difference instead of comparing mean values among the anaemic group.

We have also identified several factors that are correlated with anaemia status. One factor which affects 60% of children in our study is use of cow's milk. It was observed that consumption of cow's milk consistently presents as a risk factor for anemia in children. Cow's milk affects many of its users as revealed by Sathish *et al.*, 2015 in which 57% children were anemic because they were using cow's milk at an early age and not feeding on breast milk. In his study the infants who were not breast fed were more likely to have IDA (Iron Deficiency Anemia) as compared to breast fed infants. Lack of breast feeding also affects children at early age usually before 6 months. Our study indicates that lack of breast feeding affects 48% of children. Exclusive breast-feeding for 6 to 8 months of age is recommended because it is thought that it protects against IDA. After this period, even with the excellent bioavailability of iron in human milk, it is necessary to use complementary foodstuffs that are rich in this micronutrient i.e., iron.

The indicated increased risk of anaemia in children below the age of 24 months is consistent with findings from other countries (Austin *et al.*, 2012). This is mostly due to the increased need for iron at this age and inadequate introduction of iron-rich foods. Foods most commonly consumed by the population are cereals which do not have adequate quantity of iron.

In term of family income our data indicate that children whose family income is low had higher anaemia rates. Low family income affects 54% of child in this study. It was observed that mother's education and family income had greater impact on the status of IDA among infants. In our studied population both mother's education and family income were associated risk factors of anaemia among infants. It was seen that the infants of uneducated mothers and of those who belonged to low income families <10,000 were more likely to have IDA as compared to infants of literate mothers and of those who belonged to high income families. Similar results were shown by Oliveira *et al* 2007, Pasricha *et al.*, 2010 and Park *et al.*, 2006, reporting low socioeconomic status as a significant risk factor for anaemia. According to Soekarjo *et al.*, (2001) socioeconomic status is the root line cause for anemia among children. Iron deficiency anemia is a vicious cyclical problem in community having low income.

In our studied population, most of children were anaemic and they belonged to rural

communities. Poor bioavailability of dietary iron is a major factor for anaemia. 50% anemic children were from 1-6 years of age because at this stage they require more iron for their growth which was not provided sufficiently to meet their needs. The study provides evidence that the prevalence of anemia in these areas starts at very young age normally in those who were less than 12 years of age. Iron deficiency (ID) in these areas needs to be prevented in order to enable the children to develop and grow normally.

## CONCLUSION

The present study demonstrates that the prevalence of anemia is considerably high in children below the age of 12 years, living in rural communities. 50% anaemic children were from 1-6 years of age. It has also been concluded that hematological parameters were greatly altered in anemic patients. Breast feeding practices need to be strictly followed to prevent incidence of anemia targeting children aged less than two years of age.

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