# The prevelance of Anemia in Malnourished (Pcm) hospitalized children at (NRU/SC) LRH, Peshawar, Pakistan

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The study was conducted to investigate the frequency of anemia in severely malnourished hospitalized children. For this purpose, Leady Reading Hospital (LRH), Peshawar was selected as a host institute. A questionnaire was designed for the collection of data with the consultation of advisor and co-advisor. Nutritional status was assessed through anthropometry, family history, clinical, biochemical and dietary methods. Data was collected from 30 in-patients in NRU/SC of Leady Reading Hospital, Peshawar having anemia. Data showed that prevalence of anemia were more in male as compared to females 30 patients were diagnosed of anemia among which 53.3% were male and 46.6% female. Only 23.3 of children were vaccinated. Mean age was 22.40 months. Mean and SDS of MUAC was 10.628±2.0586 and OFC 41.692±3.619. Mean value of hemoglobin was 5.8±10.5 g/dl and TLC were 26600±6388.590. 33.3% was anemic, 6.6% were suffering from mild anemia, 26.6% were suffering from moderate anemia and 33.3% were suffering from severe anemia. It has been observed that 56.6% exclusively breast feed up to 6 months and 20.0% were taking mixed breast feeding up to 12 months of age in which most of the mothers were giving cow's milk to their child with over dilution. The most common cause of anemia was inappropriate dietary habit and delayed starting of complementary food i.e. 66.6% started complementary food at age of 1year ad most of the children consumed non-nutrition and junk foods. Many of the children showed the symptom of moderate to severe iron deficiency-anemia included: general fatigue 16.6%, pallor 43.3%, loss of appetite 40.0%, shortness of breath 30.0%, vomiting 13.3%, diarrhea 83.3%, fever 43.3%. Anemia was common among severely malnourished children. It is suggested that anemia can be prevented by eating a diet high in iron-rich foods and vitamin C. By taking nutritious food, improving cooking method, exclusive breast feeding and start of complementary food at proper age can reduce the risk of anemia in children.

**Keywords: Anemia, Iron deficiencies, Hematological parameters.**

## INTRODUCTION

Anemia can be explained as when the level of red blood cell becomes low then normal level. Due to this oxygen level are also decrease which leads to hypoxia (Sifatullah et al. 2017). Anemia

can be caused by many factors such as smoking (Hasnain et al. 2018), dengue, (Shah et al. 2019). HCV, (Muhammad et al. 2018). and also caused due to defiance of nutrition. Anemia neither cause in undeveloped country but is the main problem of developing country in which one and a half of woman population can also affected by anemia (Irshad et al. 2011). Beside of woman it can also affect children whose age are less than 5 and between 5 to 10 year (Sungthong et al. 2002). According to WHO report that there are two billion people are affected by anemia in all over the world. in which 50% of patient are caused due to iron deficiency (Balarajan et al. 2011).and 10% by smoking, (Hasnain et al. 2018) .5% by dengue (Haroon, et al. 2019). 2% by Malaria (Faisal et al. 2020).and 12% are caused due to HCV and HBV (Akbar et al. 2020). Due to deficiency of nutrient iron deficiency occur which cause anemia in worldwide (Loanovo et al. 2020). Anemia can also be diagnosed by complete blood count test (Rehman et al.2020). through complete blood count test, we can also examine the blood cell morphology which are affected due to biotic and abiotic factor (Ovuru et al. 2004) Anemia is a worldwide health problem which affect both undeveloped and developed country. But Anemia is most common in pregnant woman and children. Anemia can also cause mental health problem by which learning capacity are also reduced in child. In new born babies it can also reduce IQ level permanently, irritability, fatigue, concentration difficulty, lethargy, weakness and increased susceptibility to infection. Consequently, anemic children tend to do poorly on vocabulary, reading, and other tests (Shirakura et al. 1978) The red blood cell, hemoglobin concentration and hematocrit value will decrease in man with in sixty year and in woman it will decrease within 70 year. While these changes are occurred in between sixty to seventy year.While in reproductive stage in woman iron deficiency will occur and in man it will occur in advanced stage but less in adult stage (Sifatullah et al. 2017).

The prevalence of anemia among children under 5 years of age is estimated to be about 20% in industrialized countries and 39% in non-industrialized countries. Iron-deficiency anemia is a major problem in Iran. According to the World Health Organization (WHO) classification, the prevalence of anemia in Iran is in the moderate category, which means that 10% to 39% of women and schoolgirls of reproductive age have hemoglobin concentrations below their reference values. It is estimated that about 18% to 38% of Iranian children under-5 years of age are anemic (Keikhaei et al. 2007). The aim of this study is to evaluate the anemic patient on the basis of age and gender wise study of their blood, the hematological parameters of the subjects involved and the prevalence of anemia through the clinical examination.

## MATERIALS AND METHODS

### Location of internship
The present internship was conducted in nutrition rehabilitation unit (NRU/SC) pediatric ward, Lady Reading Hospital Peshawar to assess the nutritional status of hospitalized children suffering from anemia during the month of May to July, 2018.

### Data Collection
Data was collected from 30 hospitalized admitted children ward. Collection of data comprises of both primary and secondary data. Primary data was collected by well-structured interview schedule through questionnaire by personal interview from each attend with patient. Secondary data was collected from patient's hospital record section. The survey was conducted within a period of 3 months i.e. in May, June and July, 2018 in Lady Reading Hospital. The questionnaire made, all the questions were made, presented and necessary amendments were made accordingly. In order to get accurate data, all the questions were made clarified to each respondent. The questionnaire contained the information regarding personal information, anthropometric measurement and biochemical assessment, dietary and clinical assessment.

### Personal Information
Such as Patient name. Father name, Age, Gender, Nationality, Address.

### Anthropometric measurement
Such as Wt. (weight), Ht (height), Lt (length), OFC (occipital-frontal circumference) and MUAC (mid upper arm circumference), presence of edema and Z-score taken were according to recommended procedure which are discussed below

### Weight
The Weight of children under 2 year of age was taken in the lying position with the help of pediatric scale, while the weight of a child who

could stand was taken on adult beam scale. Both the scales were calibrated before the use.

### Height/length

The Height /Length were taken with the help of length board and studio meter. The length of the child was measured when he/she was laying straight, head touching the head piece. The food piece was mood to the feet of the child. Length was recorder in centimeter.

### Mid Upper Arm Circumference (MUAC)

The MUAC was taken with the help of MUAC tape. Mid-point was found and marked between the elbow and shoulder bone. Then the circumference was measured at the marked position and reading was noted in centimeter.

### Occipital Frontal Circumference (OFC)

Head Circumference or OFC [occipital frontal circumference] is measured over the most prominent part on the back of the head (occipital) and just above the eyebrows (largest circumference of the head). The tape is pulled snugly to compress the hair and underlying soft tissues.

### Family History

Include; Father and Mother Education, informal Education, occupation of both, family size i.e. no. of living and dead children and their income per month.

### Immunization History

Immunization History was also recorded i.e. either the child is vaccinated or not.

### Clinical assessment

Clinical assessment includes various signs and symptom like paleness, weakness rapid breathing, fatigue etc.

### Biochemical assessments

Biochemical assessments Includes Hb (hemoglobin) and TLC (total leukocytes count) serum electrolyte
.

### RESULTS

A hospital-based study was conducted on hospitalized children suffering from anemia Leady Reading Hospital, Peshawar. The total number of patients was 30. Data regarding demographic status, Anthropometry, Clinical signs and symptoms, Biochemical tests and dietary intake was collected from respondents.

Data regarding demographic and socioeconomic status is presented in table 1. Among 30 cases 16(53.33%) were male and 14(46.66%) were female. Result of father's educated showed that 10(33.33%) were educated and 20(66.66%) were uneducated. Result of father's occupation showed that 17(56.66%) were labor, 6(20%) were worker, 5(16.66%) were driver, 1(3.33%) were student, 1(3.33%) were teacher only. Result regarding mother's education showed that 2(6.66%) were educated and 28(93%) were uneducated. Result of mother's occupation showed that 28(93.33%) were House wife and 2(6.66%) were wives. No of pregnancy showed that 14(46.66%) had less or equal 5 children and 16(53.33%) had more than 5 pregnancies. Result of family income per month showed that 26(86.6) were poor, 4(13.3) were having good income per month.

**Table1: Socioeconomic and demographic characteristics of severely malnourished hospitalized children suffering from anemia**

| Variables | Frequency | | Percentage |
|---|---|---|---|
| Gender | Male | 16 | 53.3 |
| | Female | 14 | 46.6 |
| Father education | Education | 10 | 33.3 |
| | Uneducated | 20 | 66.6 |
| Father occupation | Labor | 17 | 56.6 |
| | Worker | 6 | 20 |
| | Driver | 5 | 16.6 |
| | Student | 1 | 3.3 |
| | Teacher | 1 | 3.3 |
| Mother education | Educated | 2 | 6.6 |
| | Uneducated | 28 | 93.3 |
| Mother occupation | House wife | 28 | 93.3 |
| | Working women | 2 | 6.6 |
| Number of pregnancy | ≤ Then 5 | 14 | 46.6 |
| | >Then 5 | 16 | 53.3 |
| Family income | Poor | 26 | 86.6 |
| | Good | 4 | 13.3 |

Data regarding vaccination is presented in table 2. Result of vaccination showed that 7(23.33%) were vaccinated. 1 (3.33%) were incomplete Vaccination, 19 (63.66%) Vaccination in progress and 3(10%) Vaccination is not done.

**Table 2: Immunization status of severely malnourished Hospital children suffering from anemia**

| Vaccination | Frequency | %age |
|---|---|---|
| Vaccination complete | 7 | 23.3 |
| Incomplete vaccination | 1 | 3.3 |
| Vaccination in progress | 19 | 63.3 |
| Vaccination is not done | 3 | 10 |

**Table 3: Biochemical assessment of severely malnourished Hospitalized children suffering from anemia**

| Variable | Mean ± SDS | Normal values |
|---|---|---|
| HB (gm/dl) | 5.8±10.5 | Male (14-16gm/dl) Female (12-14gm/dl) |
| TLC (cmm) | 2600±6388.590 | 4000-11000cmm |

TLC=Total leukocytes count, gm= gram, dl=deci litter, cmm=cubic mili meter.

Data regarding biochemical assessment of Hospitalized children suffering from anemia is present in table 3. Mean ±SDS of hemoglobin was 5.8±10.5gm/dl and Mean ±SDS of TLC (total leukocytes count) was 26600±6388.590 cmm.

**Table 4: Symptom of severely malnourished hospitalized children suffering from anemia**

| Symptoms | Frequency | | %age |
|---|---|---|---|
| Pallor | No | 17 | 56.6 |
| | Yes | 13 | 43.3 |
| Loss of appetite | No | 18 | 60 |
| | Yes | 12 | 40 |
| Shortness of breath | No | 21 | 70 |
| | Yes | 9 | 30 |
| Vomiting | No | 26 | 86.6 |
| | Yes | 4 | 13.3 |
| Diarrhea | No | 24 | 80 |
| | Yes | 6 | 20 |
| Fatigue | No | 25 | 83.3 |
| | yes | 5 | 16.6 |
| Fever | No | 23 | 76.6 |
| | Yes | 13 | 43.3 |

Data regarding symptoms of hospitalized children suffering from anemia is presented in table 4. Status showed that 13(43.33%) were having pallor, 12(40%) were having loss of appetite, 9(30%) were having shortness of breath, 4(13.33%) were having vomiting, 6(83.33%) were having diarrhea, 5(16.66%) were having fatigue, 13(43.33%) were having fever.

**Table5: Frequency of anemia in severely malnourished hospitalized children suffering from anemia**

| Variable | Frequency | %age |
|---|---|---|
| Anemic | 10 | 33.3 |
| Mild | 2 | 6.6 |
| Moderate | 8 | 26.6 |
| Severe | 10 | 33.3 |

Data regarding rate of anemia in hospitalized children suffering from anemia is presented in table 5. Anemia status showed that 10(33.3%) was anemic, 2(6.6%) were suffering from mild anemia, 8(26.6%) were suffering from moderate anemia and 10(33.3%) were suffering from severe anemia.

**6. Diet history of severely malnourished Hospitalized children suffering from anemia**

Data regarding diet history of hospitalized children suffering from anemia is presented in table 6. Status of exclusive breast feeding showed that 17(56.6%) were breast fed up to 6 months of age, 8(26.6%) were breast fed beyond 6 months of age, and only 5(16.6%) were not taking breast feeding. Mixed breast feeding status showed that's 8(26.6%) were not taking any type of feed, 11(36.6%) were taking mixed feeding up to 6 months of age, 6(20%) were taking mixed feeding up to 12 month of age and 5(16%) were taking mixed feed beyond 12 months of age. Status of other type milk showed that 9(30%) were not started yet any other type of milk, 3(10%) were on cow's milk, buffalo milk not started, and 18(60%) were on formula supplement. Status of dilution showed that 20(66.6%) were taking inappropriate dilution whereas 10(33.3%) were taking appropriate dilution on milk. Data regarding complementary food showed that 8(26.7%) children start complementary food at the age of 6 months, 11((36.6%) were started at 12 months, 15(16.7%) were started on after 13 months whereas 6(26.7%) were not started yet.

**Table 6: Diet history of severely malnourished hospitalized children suffering from anemia**

| Variable | Frequency | | %age |
|---|---|---|---|
| Exclusive Breastfeeding | None | 5 | 16.6 |
| | ≤then 6months | 17 | 56.6 |
| | >then 6months | 8 | 26.6 |
| Mixed breastfeeding | None | 8 | 26.6 |
| | ≤ then6months | 11 | 36.6 |
| | ≤then12months | 6 | 20 |
| | Then13months | 5 | 16 |
| Type of other Milk | Not started yet | 9 | 30 |
| | Cow's milk | 3 | 10 |
| | Buffalo | 0 | 0 |
| | Formula milk | 18 | 60 |
| Dilution | Inappropriate | 20 | 66.6 |
| | Appropriate | 10 | 33.3 |
| Complementary feeding | None | 6 | 20 |
| | ≤ 6 months | 8 | 26.7 |
| | ≤12 months | 11 | 36.7 |
| | 13 months | 15 | 16.7 |

## DISCUSSION

Most studies on anemia are population-based; those conducted using a hospitalized population are scarce, which limits comparative analysis of results.

This study found a high prevalence of anemia, reflecting the magnitude of the disease among hospitalized children. Other studies in Recife have found similar results. Salzano reported the prevalence of anemia in 6 to 60-monthold children to be 55.1% in the Lessa de Andrade Health Center and 28.3% in Hospital Geral PAM, Areias. (Salzano et al.1985) In 2005, Leal & Osório reported a high prevalence (89.1%) in a state healthcare clinic in Recife (Leal et al. 2005). Other reports analyzing state clinics in different regions of Brazil reported the prevalence in children to be 37.5% in Paraisópolis, São Paulo (Torres et al., 2006) and 55.1% in Belém do Pará (Neves et al. 2005). For the state of Pernambuco, the III State Health and Nutrition Research found a prevalence of 33%. A high prevalence of anemia has also been reported in other Latin American countries. A population study conducted by Rivera, which focused on pre-school children in Cuba, reported a prevalence of 55.6%. (Rivera et al.2003). Sanabria reported a prevalence of 52% in under 5-year-old children in a referral hospital in Paraguay.(Sanabria et al.2000) The prevalence of anemia found in this study, and in the abovementioned studies, was higher in specific population groups, indicating that the condition is influenced by socioeconomic status.

The prevalence of the problem in under 24-month-old children is likely to be a combined result of the increased iron requirements due to rapid growth, early weaning, low availability of foods rich in iron and dietary monotony. These factors are prevalent in this age group. Furthermore, unfavorable socioeconomic conditions impose living conditions that make children more vulnerable to diarrhea, respiratory infections and intestinal parasites, and may markedly compromise intake, absorption and biological utilization of iron. Balarajan, (Hall et al. 2001)

The relationship between anemia and infection remains controversial. Anemia is an immunosuppressive factor, as mild iron deficiency protects against infection, because hypoferremia reduces the amount of iron available for use by pathogens (Jansson et al. 1986). In contrast, humoral immunity is not affected by iron deficiency, and the significance of hypoferremia in the growth of microorganisms is doubtful (Krantman et al. 1982). However, it is generally accepted that excess or deficiency of iron result in changes in immune response (Travassos et al. 1999).

The role of anemia on the average time of hospitalization is difficult to interpret, given that the length of stay may be related to other factors such as the severity of the clinical condition, different medical procedures and care, and random errors (Umbelino et al. 2006) .In this study, although the length of the hospital stay was not significantly associated with anemia, it is possible that anemia resulting from nutritional and immunological conditions aggravated the primary disease, thereby prolonging hospitalization.

The high prevalence of anemia reported here suggests that this condition may be an associated causal factor, especially as the length of hospitalization was generally short, and the patient was probably anemic at the time of admission. Our results emphasize the importance of evaluating the overall nutritional status of patients, especially children, because of their greater susceptibility. They also suggest that greater preventive nutritional education during consultations and/or hospitalizations and more attention from professionals at the primary care level, are needed to prevent nutritional deficiencies. This study makes us think about the necessity of expanding coverage of supplementation programs in order to help a larger number of at-risk individuals.

## CONCLUSION

Children aged less than five-year-old are suffering from anemia. Many interrelated socioeconomic factors are influencing anemia. PCM was high in poor family status. The most common in adequate dietary intake and delayed starting of complementary food. Mostly mother was illiterate and they didn't know about proper weaning which resulted in iron deficiency. Biochemical investigation revealed that most of the children were moderately anemia.

## CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

## ACKNOWLEGEMENT

## AUTHOR CONTRIBUTIONS

H.K, R.G & S.F designed and performleed the experiments S.F wrote the manuscript. S.G & S.S help in data analysis. S.A.S, S.S, T.S, RD, FM &AK reviewed the manuscript. All authors read and approved the final version.

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