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# A GROWING CONCERN: MALNUTRITION AND ANEMIA IN CHILDREN UNDER FIVE YEARS AT DISTRICT KECH, BALOCHISTAN

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**ABSTRACT**

**BACKGROUND:** Malnutrition and anemia are significant health concerns affecting children under five years, leading to increased morbidity and developmental delays.

**OBJECTIVES:** To determine the prevalence and association of anemia and malnutrition in children under five years of age.

**METHOD:** This Cross-sectional study was carried out from Jan 2022 to June 2022 at the Department of Paediatrics, Teaching Hospital Turbat, district Kech. After getting approval from the ethical review committee, 310 children under five years of age of both genders were included in the study using a purposive sampling technique. Diagnosed cases of malnutrition and anemia, undergoing any treatment were excluded from the study. After getting sociodemographic data, the mid-upper arm circumference of the study participants was measured. A 3 ml of venous blood was drawn to measure hematological parameters. The prevalence of anemia and malnutrition was calculated as frequencies. The association of malnutrition and anemia with gender was measured using the Chi-square test. Differences in Hematological parameters among Malnourished and well-nourished subjects were measured using an independent sample t-test.

**RESULTS:** Among 310 study participants, 207 (66.8%) of the study participants were malnourished. Children aged 12-23 months were among the most affected age group suffering from malnutrition. 84.5% of the children were suffering from anemia. Malnourished participants have a significantly reduced hemoglobin level as compared to well-nourished subjects ( p-value 0.002).

**CONCLUSION:** Anemia and malnutrition are alarmingly high in children under five years of age in the district of Kech, Balochistan. Malnutrition is associated with anemia.

**KEYWORDS:**Anemia,Children, Gender, Malnutrition, Mid-Upper Arm Circumference, Prevalence,

## INTRODUCTION

The term "nutrition" refers to the essential role that nutrients play in the maintenance, development, and reproduction of the organism. Everyone has the inherent right to adequate nutrition, which includes the ability to purchase and prepare nutritious food at a price that is affordable to them. With malnutrition, which can be brought on by an excess, deficiency, or imbalance of nutrients, one can observe serious adverse effects on body composition, function, and clinical outcome. Malnutrition can be caused by any of these three factors. The unfortunate reality is that it is more prevalent in developing nations, which are characterized by widespread poverty, social isolation, and dependence on drugs. There are many factors, including environmental and behavioral factors, as well as illness, that can reduce nutrient intake and/or delivery, which can lead to malnutrition [1,2]. Children in underdeveloped nations are disproportionately affected by malnutrition, which is one of the most prevalent causes of serious health problems and developmental delays. In these nations, malnutrition is responsible for 3.5 million deaths and 35 percent of all illnesses that occur in children younger than five years old [3]. Undernourishment can take the form of acute malnutrition, which can be either primary or secondary. This type of malnutrition is brought on by an inadequate intake of either calories or protein. Children in low- and middle-income countries are more likely to suffer from primary acute malnutrition than children in other countries. This is because of the inadequate food supply that is caused by environmental, political, and socioeconomic factors [4].

Malnutrition can be broken down into two primary categories: overnutrition, which is also referred to as obesity, and undernutrition [5]. Undernourishment is one of the leading causes of death across the globe. Pakistan has a very high rate of child mortality and a very high prevalence of child malnutrition when compared to other governments that are still in the process of developing their economies. It is more common for girls to suffer from severe malnutrition than it is for boys [6]. When children are in their formative years, they need to receive adequate nutrition to ensure that they have a healthy immune system, as well as proper physical and mental development. In areas that have been severely impacted by natural disasters such as floods, the undernourishment of children under the age of five is strongly influenced by factors such as poverty and a lack of educational opportunities. In the United States, severe acute malnutrition is responsible for the deaths of approximately one million children under five years of age every year. Roughly twenty million children all over the world are affected by this condition. It has been linked to malnutrition in developing nations, which is associated with stunted growth and high mortality rates [7].

The middle of the upper arm circumference (MUAC) measurements have been embraced as a simple, fast, and accurate way to identify malnutrition in children younger than five years old, particularly in cases that require immediate attention. While stunting, wasting, and underweight are all anthropometric indicators that have been used to assess the nutritional status of children, MUAC measurements have been embraced specifically for this purpose [8].

The fact that anemia affects nearly two billion people all over the world makes it a significant problem in terms of public health. Anaemia is a condition that is characterized by a lower-than-normal concentration of hemoglobin. This condition hinders the ability of the blood to carry oxygen, which has negative consequences for many aspects of health. These include the health of the mother and child during pregnancy and childbirth, the ability of the child to learn and grow, and the level of productivity and income of the adult. When these effects are multiplied across all populations, they result in significant economic losses due to the costs of treatment and the loss of gross domestic product (GDP) [9]. Anemia in young children is widely recognized as a significant public health concern. A hemoglobin level that is lower than 110 g/L is considered to be anemia, and 43 percent of children aged 6 to 59 months are affected by this condition. Anaemia is a major cause of mortality and morbidity in children, and it is associated with impairments in brain development and cognitive functions. Anaemia is a major preventable cause of death. Anaemia is the third leading cause of disability overall and ranks thirteenth globally in terms of disability-adjusted life years. It is also the thirteenth leading cause of death worldwide. According to the reports, between forty and seventy percent of children in Pakistan who are under the age of five suffer from anemia. The high infant mortality rate in Pakistan has been linked to anemia, which has also been linked to growth

retardation, impaired cognition, and reduced physical activity in children. It has been hypothesized that anemia is a contributing factor to this high rate. The widespread deficiency of micronutrients in Pakistan, which is accompanied by other social and clinical factors, is thought to be the primary cause of anemia in the country [10].

Studies reflecting the burden of malnutrition and anemia in children under five years of age in the largest province of Pakistan are very limited. The current study aim to identify the prevalence of malnutrition and anemia and their association with gender in children under five years of age in the second-largest city of the province Balochistan (Turbat).

## METHODOLOGY

After getting approval from the Institutional Ethical Committee (Ref: MMC/ERC/2022/F/02), this cross-sectional study was conducted at the Department of Pediatrics Teaching Hospital District Kech, Balochistan from Jan 2022 to June 2022 for a period of six months.

The sample size of 310 patients was estimated using the WHO calculator (www.openepi.com version 3), with 90% power of the test and an alpha of 0.05. This estimation was based on a 56% frequency of anemia found among stunted children [12]. After getting informed consent from parents, a total of 310 children under five years of age of both genders were included in the study using a purposive sampling technique. Diagnosed cases of malnutrition and anemia, undergoing any treatment were excluded. The sociodemographic data of participants were collected on a structured proforma. A pre-tested and validated questionnaire was used for each study participant to collect data [22]. This questionnaire was adapted from a survey tool previously utilized in a study conducted in Kenya. The questionnaire collects detailed information on demographic data, nutritional status, health indicators, anemia assessment, household environment, and additional socioeconomic factors. The mid-upper arm circumference of the study participants was measured using Shakir's measuring tape to the nearest of 1mm. Mid-upper arm circumference of < 12.5cm was considered as malnourished. The classification into MAM and SAM was not performed to maintain focus on overall malnutrition prevalence and characteristics in the study population. A 3 ml of venous blood was drawn to measure hematological parameters. SPSS version 21 was used for the analysis of data. The prevalence of anemia and malnutrition was calculated as frequencies. The association of malnutrition and anemia with gender was measured using the Chi-square test. Differences in hematological parameters among malnourished and well-nourished subjects were measured using an independent sample t-test. The p-value of 0.05 was considered statistically significant.

## RESULTS

In Table 1, Out of a total of 310 study participants, 182 (58.7%) participants were males and 128 (41.23%) study participants were females. The mean age of the study participants was 29.6±8.0 months. The mean mid-upper arm circumference of study participants was 12.26±1.06 cm, Whereas the mean mid-upper arm circumference of male and female study participants were 12.14±1.07cm & 12.34±1.03 respectively. No significant difference in mid-upper arm circumference among male and female study participants was found (p-value 0.097).

**Table 1: Characteristics of Study Participants by Gender**

| Characteristics | Total (n = 310) | Males (n = 182, 58.7%) | Females (n = 128, 41.3%) | p-value |
|---|---|---|---|---|
| Mean Age (months) | 29.6 ± 8.0 | - | - | 0.097 |
| Mean Mid-Upper Arm Circumference (cm) | 12.26 ± 1.06 | 12.14 ± 1.07 | 12.34 ± 1.03 | |
| Patients with Anemia | 262 (84.5%) | 151 (82.96%) | 111 (86.7%) | 0.369 |
| Patients without Anemia | 48 (15.5%) | 31 (17.04%) | 17 (13.3%) | |
| Malnourished | 207 (66.8%) | 117 (64.29%) | 90 (70.31%) | 0.267 |
| Well-nourished | 103 (33.2%) | 65 (35.71%) | 38 (29.69%) | |

Table 2, among 310 study participants, 207 (66.8%) of the study participants were malnourished. Of the 310 study participants, 262 (84.5%) were diagnosed with anemia. Among the males, 82.96% were anemic, while 86.7% of the females were affected. No significant gender difference in anemia prevalence was observed (p-value = 0.369).

**Table 2: Characteristics of Study Participants by Gender**

| Characteristics | Total (n = 310) | Males (n = 182, 58.7%) | Females (n = 128, 41.3%) | p-value |
|---|---|---|---|---|
| Mean Age (months) | 29.6±8.0 | - | - | - |
| Mean Mid-Upper Arm Circumference (cm) | 12.26 ± 1.06 | 12.14 ± 1.07 | 12.34 ± 1.03 | 0.097 |
| Patients with Anemia | 262 (84.5%) | 151 (82.96%) | 111 (86.7%) | 0.369 |

The table 3 shows the distribution of malnutrition across different age groups. The percentage of malnourished children varies significantly with age, with the highest proportion in the 12-23 months age group (87.8%) and the lowest in the 48-59 months age group (25.0%). The chi-square value indicates a significant association between age and malnutrition (p-value < 0.001).

**Table 3: Association of Malnutrition with Age in months**

| Age in Months | Malnutrition | Chi-square | $X^2$ | p-Value |
|---|---|---|---|---|
| | No (%) | Yes (%) | 84.29 | p < 0.05 |
| 6-11 | 1 (100%) | 0 (0%) | | |
| 12-23 | 16 (12.2%) | 115 (87.8%) | | |
| 24-35 | 15 (25.0%) | 45 (75.0%) | | |
| 36-47 | 20 (40.0%) | 30 (60.0%) | | |
| 48-59 | 51 (75.0%) | 17 (25.0%) | | |
| Total | 51 (75.0%) | 17 (25.0%) | | |

The table 4, compares hematological parameters between malnourished (n = 207) and well-nourished children (n = 103). Malnourished children had significantly lower hemoglobin levels (8.72 ± 1.98 g/dl) compared to well-nourished children (9.47 ± 1.93 g/dl), with a p-value of 0.002, indicating a significant difference. The mean MCHC was also lower in malnourished children (30.76 ± 2.82%) compared to well-nourished children (31.54 ± 2.59%), with a p-value of 0.02, suggesting a significant difference. Other parameters, including RBCs, haematocrit, MCV, MCH, WBCs, and differential counts of neutrophils, lymphocytes, eosinophils, basophils, and monocytes, did not show statistically significant differences between the two groups.

**Table 4: Difference in Hematological Parameters Among Malnourished and Well-Nourished Children**

| Haematological Parameter | Malnourished (n = 207) (Mean ± S.D) | Well-nourished (n = 103) (Mean ± S.D) | p-value |
|---|---|---|---|
| Haemoglobin (g/dl) | 8.72 ± 1.98 | 9.47 ± 1.93 | 0.002* |
| RBCs (million/mm³) | 4.31 ± 0.85 | 4.41 ± 0.85 | 0.313 |
| Haematocrit (%) | 29.8 ± 10.3 | 30.9 ± 8.7 | 0.355 |
| MCV (μm³) | 67.22 ± 8.78 | 69.01 ± 8.70 | 0.091 |
| MCH (pg) | 21.38 ± 7.08 | 22.91 ± 9.03 | 0.104 |
| MCHC (%) | 30.76 ± 2.82 | 31.54 ± 2.59 | 0.02* |
| WBCs (per mm³) | 10.02 ± 0.67 | 9.91 ± 0.49 | 0.878 |
| Neutrophils (%) | 48.24 ± 17.60 | 49.54 ± 19.33 | 0.553 |
| Lymphocytes (%) | 42.96 ± 16.58 | 41.75 ± 17.40 | 0.553 |
| Eosinophils (%) | 5.96 ± 3.58 | 6.26 ± 4.41 | 0.521 |
| Basophils (%) | 1.49 ± 0.63 | 1.43 ± 0.59 | 0.382 |
| Monocytes (%) | 1.1 ± 0.63 | 1.1 ± 0.60 | 0.173 |

The table 5 examines the association of gender with anemia and malnutrition among the study participants. The prevalence of anemia was 48.7% in males and 35.8% in females. The difference was not statistically significant (p-value = 0.369). The prevalence of malnutrition was 37.7% in males and 29% in females. This difference was also not statistically significant (p-value = 0.267).

**Table 5: Association of Gender with Anemia and Malnutrition**

| Parameter | Male | Female | Chi-square | p-value |
|---|---|---|---|---|
| Anemic | 151 (48.7%) | 111 (35.8%) | 0.808 | 0.369 |
| Non-Anemic | 31 (10%) | 17 (5.5%) | | |
| Malnourished | 117 (37.7%) | 90 (29%) | 1.23 | 0.267 |
| Well-nourished | 65 (21%) | 38 (12.3%) | | |

## DISCUSSION

Public concern over child malnutrition is growing. Children are more likely to suffer from malnutrition due to a lack of proper nutrition, inadequate care, infectious diseases, and discrimination in food distribution at the household level. The current study addresses the prevalence of anemia and malnutrition in children younger than five in Turbat, district Kech, Balochistan, as well as their association with one another. The current research examined 310 children, all under the age of 5, from both sexes.

When compared to other developing nations, Pakistan has a very high rate of child malnutrition. Nearly 50% of Pakistani children under the age of five suffer from malnutrition [11]. Significantly lower odds of malnutrition are associated with improved socioeconomic status. Poverty, social insecurity, inflation, unemployment, and food insecurity are some of the economic crises that Pakistan is currently facing [12,13].

Among those who took part in the current research, 66.8% were malnourished. Previous studies indicate a relatively low prevalence of malnutrition in children younger than five years of age. This might be attributed to the sickness of the children for whose treatment they are visiting the hospital. According to research done in Multan by Asif et al., 18.3% of children younger than 5 years old suffer from malnutrition [14]. Biswal et al. found that 32.22 percent of children under the age of five in West Bengal, India, were malnourished [15]. Researchers Huq et al. found that 46% of children under five years of age in Peshawar, KPK, Pakistan, were malnourished [16]. The prevalence of malnutrition in children younger than five years old was reported as 66.1% in a study by Menghwar et al., which is consistent with our findings [17]. Both districts i.e our study district Kech and district Tharparkar have similar socioeconomic status. According to research done in Peshawar, KPK, Pakistan by Hadi et al., 70% of children were found to be malnourished when measured by their MUAC [18].

In children under five years old, anemia is still a big problem. Anemia affects 84.5% of children under five years old, according to our study. When compared to earlier published data on anemia in children younger than five, this figure is shockingly high. In a study carried out in Karachi, Khan et al. found that the anemia in children under five years old was 63.7% [19].

In contrast to the study by Laghari et al., which found that severe malnutrition is more common among females, no significant association amid anemia and gender was found in our research. The high literacy rate of females in district kech might be a contributing factor to this. One of the most important factors in reducing the disaster's fatalities was the education of females [20]. Reducing poverty, increasing economic growth, strengthening adaptive capacity to climate change, and decreasing vulnerability to natural disasters all require education as a means of empowerment [21]. In our study no significant gender difference was found to be associated with malnutrition and anemia. This could be because the female literacy rate of district kech is 56.6%.

The overall prevalence of anemia and malnutrition in children under 5 years is alarmingly high in district Kech and policymakers should take steps to reduce it. Our study has a few limitations. The current study can be done on a larger sample size. Our sample size included only those children who came to the pediatrics department of the teaching hospital district Kech.

## CONCLUSION

High prevalence of anemia and malnutrition in children at district kech needs urgent targeted interventions. With 66.8% of participants found to be malnourished and a staggering 84.5% suffering from anemia, this study highlights a significant public health concern. While gender did not show a significant association with malnutrition and anemia, the overall prevalence of these conditions in children under five in District Kech is alarming. Policymakers and healthcare providers must prioritize interventions aimed at improving nutrition and reducing anemia in this vulnerable population.

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