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Research Article

**STUDY TO DETERMINE THE LEADING CAUSES OF
MORTALITY IN DEVELOPING COUNTRIES AND HOW IT
CAN BE PREVENTED**

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Abstract:

Introduction: Infant and child mortality remains high in the poor population of developing countries.

Aim: The aim of the study was to determine the main causes of death among children admitted to hospital with acute diseases in a developing country.

Study Design: A descriptive observational study.

Place and duration of studies: Department of Pediatrics Unit-1 of Nishtar Hospital, Multan for one-year duration from July 2019 to July 2020.

Patients and Methods: The study population consisted of children admitted to the 1st General Medical Ward, who died from various diseases.

Results: Out of 100 deaths of children, 62 (62%) were male and 38 (38%) were females. The age range was 1 month to 14 years. The maximum number of deaths was <1 year 69 (69%) and only 7 (7%) of all deaths were > 5 years of age. Deaths were maximum in the first few months of life, with 46% occurring in the first 6 months. 41 (41%) children had a body weight of 80%. Intestinal disease was the most common cause of 36 (36%) of all deaths, followed by acute lower respiratory tract infection (ALRI) 27 (27%) and central nervous system (CNS) infection in 25 (25%). Besides, the number of diseases was negligible.

Conclusion: A significant proportion of child deaths can be prevented by developing strategies to reduce malnutrition and infection.

Key words: child mortality, malnutrition

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INTRODUCTION:

About 8 million children die each year from preventable causes. Child mortality under the age of 5 is a major indicator of children's health and overall development in countries, and is therefore also an indicator of the Millennium Development Goals (MDGs). In Pakistan, the figure was 86,501, according to a recent World Bank report. It is often said that children are our future, but around the world many still die from the vicious cycle of poverty, conflict and a lack of adequate healthcare. In 2010, 7.6 million children under five died, representing an under-five mortality rate of 57/1000 live births, of which around half of the child deaths occurred in Africa. 49% (4 • 29 million) of child deaths occurred in just five countries: India, Nigeria, the Democratic Republic of Congo, Pakistan and China. Globally, only six causes account for three-quarters of deaths in childhood: pneumonia (19%), diarrhea (18%), malaria (8%), neonatal pneumonia or sepsis (10%), preterm labor (10%) and asphyxia at birth (8%). Malnutrition is a risk factor which is suspected to be an additional contributor to approximately half of all childhood mortality. Up-to-date information on the causes of child death is essential to support global efforts to improve child survival. Knowing the patterns and trends in the causes of under-five mortality is essential for appropriate health interventions and monitoring progress. The aim of the study was to determine the main causes of death among children with acute diseases admitted to hospital in a developing country.

PATIENTS AND METHODS:

It was a descriptive study conducted at the Department of Pediatrics Unit-1 of Nishtar Hospital, Multan for one-year duration from July 2019 to July 2020. All patients admitted who later died were enrolled in the study. Their clinical features were recorded on a pre-designed proforma and included age, gender, place of residence, nutritional status, symptoms, test results, and length of hospital stay.

Body weight below 60% was considered severe malnutrition, 60% to 70% moderate malnutrition, 70% to 80% mild malnutrition, and weight > 80% normal nutritional status. Relevant laboratory data including blood count (CBC), kidney function test, cerebrospinal fluid (CSF), chest X-ray (CXR), arterial blood gas (ABG), C-reactive protein (CRP), blood culture and sensitivity (C / S) recorded. Hemoglobin <6 mg / dL was considered severe anemia, 6 to 10 mg / dL for moderate anemia, 10 to 11 mg / dL for mild anemia, and > 11 mg / dL for normal hemoglobin. The diagnosis was made while in the ward. These patients were followed during their stay, and after death, their records were verified to determine the cause of death. All patients with chronic ailments, congenital malformations and malignancies were excluded because chronic diseases generally had a poor prognosis and this study looked at childhood deaths with acute illnesses.

Statistical analysis: Data were categorized down by gender, age group (1-2 months, 3-6 months, 7-12 months, 1.1-2 years, 2.1-5 years and > 5 years), place of residence (Lahore or outside of Lahore). Total and cause of mortality rates were calculated by age and place of residence. Length of stay is recorded. The causes of deaths are divided into the following categories: acute gastrointestinal infections, acute lower respiratory infections, meningitis, other infectious diseases, and other causes. SPSS 16.0 version was used for data analysis. This study established differences in childhood mortality using frequency distribution. Chi-square test was used to identify factors related to child mortality, and a p value of <0.05 was considered significant.

RESULTS:

A total of 100 deaths were analyzed. The age range was 1 month to 14 years. Only 7 (7%) of all deaths were > 5 years of age. Most of the deaths occurred in the first few months of life, with 46% in the first 6 months (Fig. 1).

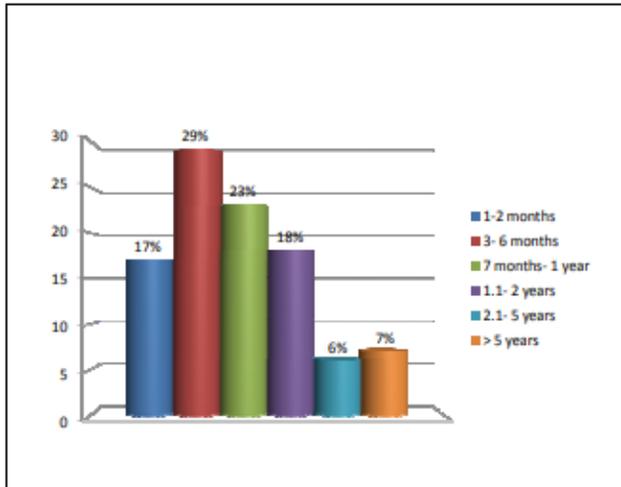


Fig 1: Deaths according to age

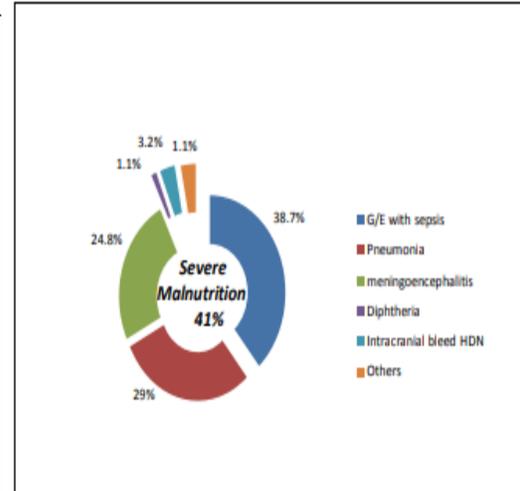


Fig 2: Under 5 mortality

Of these 100 children, 62 (62%) are males and 38 (38%) are females. 52 (52%) of the patients were from Lahore and 48 (48%) were non-Lahore residents. The mean hospital stay was 7 days (range <24 hours to 14 days), approximately 1/3 38 (38%) children died within 48 hours of admission, and 1/3 34 (34%) died within 5 days. and only 1/3 remained in the ward for 7-14 days (Table 1).

TABLE 1: Demographics, duration of stay of 100 children

| Category | Total |
|---------------------------|------------|
| | N= 100 (%) |
| Sex (M:F) | 1.6:1 |
| Male | 62 (62.0) |
| Female | 38 (38.0) |
| Place of living | |
| Lahore | 58 (58.0) |
| Outside Lahore | 42 (42.0) |
| Duration of hospital stay | |
| < 24 hrs | 12 (12.0) |
| 24 hrs- 2 days | 26 (26.0) |
| 2 days- 5 days | 34 (34.0) |
| 5 days- 7 days | 14 (14.0) |
| >7 days | 14 (14.0) |

Common symptoms were fever 88 (88%), loose movements 43 (43%), vomiting 55 (55%), cough 31 (31%), difficulty breathing 32 (32%), seizures 34 (34%), loss of consciousness 37 (37%) and 81 (81%) were misfed. 41 (41%) children were severely malnourished and weigh <60. percentile for age, 47 (47%) had mild to moderate malnutrition and only 12 (12%) had a weight appropriate for their age. 58 (58%) patients had moderate to severe anemia (Table 2).

TABLE 2: Nutritional status and hemoglobin level

| Variables | Normal (%) | Mild (%) | Moderate (%) | Severe (%) |
|-------------------------------------|--------------|--------------|--------------|--------------|
| Nutritional status/ Malnutrition | 12 (12.0) | 14 (14.0) | 33 (33.0) | 41 (41.0) |
| Hemoglobin level/ Anemia | 22 (22.0) | 20 (20.0) | 49 (49.0) | 9 (9.0) |

Evidence of infection was seen in the blood culture and sensitivity report which was available in 45 (45%) patients with a positive 20% result. The organisms isolated were Enterobacteriaceae 3, Coagulase-ve Staphylococcus, Klebsiella, Burkholderia cepacia, E. Coli. CRP report was available in 39 (39%) patients with elevated levels in 37 (37%) showing an efficiency of 95%. On admission, 25 (25%) patients had significantly impaired RFTS (0.00), and 52 (52%) patients had metabolic acidosis. An elevated total leukocyte count (TLC) > 11,000 was present in 61 (61%) patients (0.023) and thrombocytopenia (platelet counts in the 5-year group and they were also mainly due to infectious causes, 2 of which were meningitis, tetanus and complications of measles (encephalitis and pneumonia). 1 patient died of an autoimmune disease (systemic lupus erythematosus).

DISCUSSION:

Improving the survival and health of children are widely accepted goals of the healthcare system (under the Millennium Development Goals of the MDGs). Nations are committed to reducing child mortality by two-thirds by 2015. Child mortality is a critical measure of child well-being and a good proxy for overall development levels. In addition, related information on causes of death is essential epidemiological data for appropriate interventions to reduce mortality under the age of five. Despite advances in antimicrobial treatment and the development of vaccines, ironically, infectious diseases continue to account for more than two-thirds of child mortality in developing countries. Unfortunately, Pakistan ranks eighth among the countries with a 95% burden of communicable diseases. The main cause of death are infectious diseases in over 70% of children⁵. In a recent survey of child mortality under the age of five in countries around the world, the leading causes of death among children under five are pneumonia and diarrhea followed by birth injuries, measles, malaria, birth defects, hemolytic diseases, maternal infections, and

malnutrition⁶. Multiple studies in Pakistan, India, Bangladesh, China and Iran confirm that pneumonia is the leading cause of childhood death, followed by diarrhea. Over 2 billion people, mostly women and young children, are believed to be deficient in iron. Stoltzfus, Mullany, and Black (2004) found that iron deficiency anemia caused 841,000 deaths annually. Factors contributing to the high mortality of children hospitalized with severe malnutrition included acute bacterial infections, electrolyte imbalance, and micronutrient deficiencies. In our study, 2/3 of the patients had low hemoglobin <10 g / dL, which is consistent with the Bachou study in which 90% of the children had hemoglobin <10 g / dL. White blood cell counts (absolute and / or differential) appear to be a good predictor of bacteremia in RFTS studies, but the actual cut-off level varies from study to study. Criteria > 15,000 / mm³ total white blood cell count for bacterial infection and <15,000 / mm³ for non-bacterial infection were more effective predictors. In our study, 60% of children with diarrhea and pneumonia, 72% of patients with meningitis had leucocytosis. In the Omolola study, bacteremia was confirmed in 39%. South Asian countries still have both the highest rates of malnutrition and the highest number of malnourished children. Indeed, the prevalence of malnutrition in India, Bangladesh, Afghanistan and Pakistan (38–51%) is much higher than in Sub-Saharan Africa (26%)³⁰. In our study, 41% of children were severely malnourished, while 33% had moderate malnutrition which was in line with the study by Laura *et al.* in which deaths from malnutrition account for 53% of all childhood deaths. Malnutrition greatly increases the burden of life-threatening diseases in developing countries. Results from 53 developing countries, with nationally representative weight-per-age data, indicate that 56% of child deaths can be attributed to the aggravating impact of malnutrition; surprisingly 83% of these can be attributed to mild to moderate malnutrition as opposed to severe malnutrition. This study had some limitations, one of which was the inability to collect deaths under the age of 5 in the community, although

most of such deaths reportedly take place in hospitals.

CONCLUSION:

It was found that 69% of mortality in children under 5 without neonatal causes occurs in the first year of life. A large proportion of the deaths of young children can be attributed to preventable causes and malnutrition.

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