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Post Neonatal Under Five Mortality – A Hospital Based Study

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Abstract
Background*: Under five mortality data from a hospital is the reflection of what is obtainable in a community at large. Therefore, data obtained from such study is usually beneficial in re-evaluating the leading cause of death, existing services and in improving facilities and patient care.*
Objective*- The aim of this study was to evaluate the mortality pattern of post neonatal under five children admitted in the pediatric ward of a tertiary care hospital in the eastern part of India during November 2009 to September 2011.*
Materials and Methods*: This was a prospective hospital based study. All the cases which were potentially very sick, information about the infants/children were taken and the cases who were died in due course, they were included in the study. Neonatal cases, surgical cases and those who left against medical advice were excluded.*
Results*: There were 15788 admissions during the study period. 819 of the total number of admissions died in the pediatric ward giving a mortality rate of 5.19%. Post neonatal infancy contributes 57.4% hospital admission and also maximum number of death. The commonest causes of death were septicemia and acute respiratory infection. More than half (51.5%) of the deceased children had malnutrition.* ***Conclusion****: As malnutrition and infection go hand in hand, we need to improve the nutritional status and decrease child and infant mortality by promoting exclusive breast feeding in the initial 6 months, proper complementary feeding, immunization, hygiene and sanitation, parental education and early health seeking for proper treatment, so that MDG 4 can be achieved by 2015.*
Keywords*: mortality pattern, under five children, septicemia, malnutrition.*

I. Introduction

Child mortality particularly Under five mortality and infant mortality is a leading indicator of the level of child health and overall development in countries. [1] The infant and child mortality rate is negatively associated with the level of living & reflects the country's level of socio-economic development and quality of life. In India, infant mortality and under-five mortality rate has continued to remain high as compared to the developed countries and many of the developing countries i.e IMR (2012) in India 44, United States 6 and in Sri lanka 8. [2] Although an epidemiological data of mortality by field survey is most helpful in determining the status of a community, this is often unavailable or incompletely available and unreliable in most of the developing countries due to poor registration system and more over most death are unattended by qualified person due to some reasons or other. The causes of mortality are often poorly documented in developing countries. The Medical Records Department in a teaching hospital has a system of compilation and retention of records, yet the acquisition of meaningful statistics from these records for health care planning and review is lacking. Mortality data from hospitalized patients reflect the causes of major illnesses and care-seeking behavior of the community as well as the standard of care being provided. Records of vital events like death constitute an important component of the Health Information System. Many authors have depicted pneumonia, diarrhea, sepsis, meningitis, measles, severe malnutrition, anemia, injuries as major causes of under five mortality with one cause being preceding to other as first cause, explaining different mortality pattern in different parts of India. [3-8]

Despite different studies in India and extensive publications at international level about mortality pattern in under fives, no uniformity of causes of death has been found. This study focuses to know the cause specific mortality and nutritional status related to this under five (postneonatal) deaths so that appropriate strategies can be taken against different disorders to reduce the mortality and to provide better health to the community.

II. Study material and method

It was a prospective hospital based study carried out in a tertiary care hospital in the eastern part of India, during November 2009 to September 2011. All deaths of hospitalized children from 29th day of life to the age of 4 years 11 month 29 day i.e less than five years were included in the study. The neonates (<=28day) admitted to neonatal care unit were excluded from the study because most of the time exact cause of death is multifactorial. Surgical cases and those children who left against medical advice were also excluded from the study. All the cases which were potentially very sick, information about the infants/children were taken and the cases who died in due course, they were included in the study. In addition the cases that were more or less stable and died suddenly, data was collected at the time of death and included in the study. All the data were recorded in the preformed proforma and at the end statistically analysed by using SPSS 13 and Microsoft excel.

III. Observation

During this period total numbers of children admitted were 15788, out of which 819 children died (5.19% of total admission). Maximum number of deaths occurred in children between the age group 29 days to 1 year (6.02% of total admission), followed by 3 to 5 years and 1 to 3years (3.95%). (Table 1)

We have also tried to find out whether nutritional status have any role on the mortality of under five, as malnutrition is the most important cause of secondary immunodeficiency, leading to increased occurrence and severity of infections. [Table 2]

When we compared death with malnutrition, it was seen that 54.6% of the 29 d-1 yr age group children had normal nutritional status while only 26.6% of >3yr age group were normal. All age groups were suffering from acute malnutrition in a significant percentage i.e 29d-1yr(42.1%), >1yr-3yr (35.6%), >3yr(34.2%). 11.4% of the >3yr age group children were having chronic malnutrition in comparison to 5.7% in >1-3yr age children. 422 (51.5%) of the children died were malnourished. Overall, 48.5% of the children had normal nutritional status, but only 24.93% in > 1 year age group children. (Table 2)

Maximum number of deaths had occurred due to Septicaemia (26.5%), followed by ARI and its complications (23.4%), CNS infection (16.7%), Heart diseases (11.2%), Severe Malaria (7.1%). Severe acute malnutrition (SAM) with complications (1.3%) and acute gastroenteritis (1.3%) still were contributing to a small proportion of deaths. Liver diseases contributed to 2.9% of deaths. Measles and its complications contributed to a very small percentage of death (0.4%). [Table 3]

IV. Discussion

The total number of under five admission was 15788 and out of the total admission, 819 children succumbed to death which is 5.19% of the total admission. The admission and deaths were categorised into three age groups i.e 29 days to 1yr, >1yr to 3yr and >3 yrs because disease pattern and cause of death in these age groups are similar. Observation showed maximum percentage of death occurred during infancy (3.46% of total under five admissions) compared to higher age groups (Table 1). Infants are more vulnerable to serious illness because of their immature immune system and less resistance towards common infections. On the other hand, because of the subtle manifestation of the diseases they usually come to the hospital in critically ill condition with grave prognosis. According to child survival safe motherhood (CSSM) Report, deaths in the neonatal period dominated by endogenous factors whereas post neonatal deaths were influenced by exogenous factors.[9] Diarrhoea and respiratory illness are the main cause of death during post-neonatal period.

While analyzing age-wise outcome among the hospitalised children, out of 9065 infants admitted, 546 (6.02%) infants died due to different causes (table 1).The risk of death amongst the higher age group was significantly lower than the post-neonatal group**.** Because of the poor breast feeding practice, delayed and faulty weaning practice and inadequate immunization, overcrowding, they were prone for malnutrition and infections. Out of total 819 deaths, 546 deaths (66% of total death), almost more than two third occurred during post neonatal infancy. One study by Awasthi S.et al (1994) in urban slums of Lucknow, found that almost three quarter deaths in children less than five years of age occur in infancy [7]. According to Hoa D.P.et al (1997) in Vietnam, 80% under five deaths occurred during infancy but mainly in the neonatal period. In these studies they have included neonates so their infant mortality is high compared to our study and also these were community based studies. [10]

Protein energy malnutrition (PEM) is a major public health problem in India. This affects the child at the most crucial period of time of development, which can lead to permanent impairment in later life. PEM is measured in terms of underweight (low weight for age), stunting (low height for age) and wasting (low weight for height). The prevalence of stunting among under five is 48% and wasting is 19.8% and with an underweight prevalence of 42.5%, it is the highest in the world [11]. Undernutrition predisposes the child to infection and complements its effect in contributing to child mortality. The vicious cycle of infection and undernutrition go hand in hand. With inadequate dietary intake, the immune response gets weaker and increases susceptibility to infections. A single episode of infection is easy to regain but if the child suffers from repeated infections

without adequate dietary intake, it becomes difficult to regain normal growth. Infection was commonly diagnosed in children suffering from under nutrition.[12] One of the first studies to associate infection and malnutrition was cited from India where children developed diarrhea during the weaning period which resulted in growth faltering (Gordon *et al.*, 1964; Scrimshaw *et al.*, 1968 cited in Gragnolati *et al.*[13]). 46.8% of infants suffering from acute diarrhea were underweight and it was worse for those children having persistent diarrhea (83.35%). [14] Respiratory infections were found to be the second common infection in children with malnutrition. [15]

The distribution of cases according to nutritional status (Table 2) showed that out of 819 children died, more than half, 51.5% were malnourished and 96 (11.7%) were stunted. 54.6% of the 29 d-1 yr age group children had normal nutritional status while only 26.6% of >3yr age group were normal. All age groups were suffering from acute malnutrition in a significant percentage i.e 29d-1yr(42.1%), >1yr-3yr(35.6%), >3yr(34.2%). This describes that disease and malnutrition cycle is vicious, one preceding the other. This table also shows a significant association of increasing age with chronic malnutrition. Because of impaired immune system in malnourished, the infection manifest in lethal form leading to complications and thus the risk of mortality was more than their healthy counterpart. [16]

The causes of death amongst 819 under five hospitalised deceased children during the study period are listed in the table (Table 3). Septicemia (26.5%) was the major cause of hospitalised under five mortality followed by ARI with or without complications (23.4%), CNS infection (16.7%), heart disease with complication (11.2%) severe malaria (7.1%) and other less common causes shown in the table. Arora NK et al found post neonatal causes of death were ARI (33%), Diarrhoea (26%), sepsis and meningitis (6.4%) [4] while Nandan et al (2005) found Diarrhoea (21.9%), severe malnutrition (20.4%), pneumonia (16.6%), measles (7.8%). [5] Our study depicted some similarity with Chaturvedi P et al who found septicaemia accounting for 26.3% of deaths, and also with Dutta D et al (1997) [6,8]. However, percentage of diarrhoeal deaths (1.3%) and measles with complication (0.4%) were very less in our study which may be because of the cause that our hospital is a referral institute. In a study by Awasthi Shally (1994) in Lucknow found that leading causes of under five death were pneumonia (23.4%), diarrhoea (20.9%), malnutrition and anemia (11.4%).[7]

As it was a hospital based study, heart diseases contributed to a large percentage of mortality (11.2%) which is comparable to study of Saxena et al i.e 10% of infant mortality.[17]

V. Summary

- Out of 15788 under five (postneonatal) children admitted during the study period, 5.19% children died.
- 57.4% of deaths were in 29d-1yr age group..
- 51.5% of deceased children were malnourished.
- Major diseases leading to death in descending order were Septicaemia (26.5%), ARI &complications (23.4%), CNS infection(16.7%), Heart diseases and complication (11.2%), Severe Malaria(7.1%).
- Acute Gastroenteritis (1.3%) and Measles with complications constitute only a minor percentage of death.
- Severe malaria still contributing to 7.1% of death.

Limitations

Our study can be criticized on the basis, that we have collected data from a tertiary care hospital, though data from community is the most accurate method of data collection. But we still think that the majority of deaths reportedly occur in hospitals due to awareness among people for health. Therefore hospital mortality study reflects the mortality in community.

VI. Conclusion

In conclusion, we found that more than 66% of mortality in under- 5 year (post neonatal) old children occurs during the 29 days to 1 year of life. The most common causes of death were septicemia and respiratory infection. Despite substantial progress, the world is still falling short of the MDG child mortality target. The MDG goal of reducing child mortality by 2015 seems a distant target if the determinants are dealt in isolation. It requires a holistic approach due to the complex interrelation of factors in causation of child mortality, which is a major concern for the development of India. Preventable diseases are the main causes of under-five deaths and appropriate action needs to be taken to address them. Therefore we need to increase vaccination coverage among the children of lower socioeconomic status and uneducated parents. It is disturbing to find out that many people have not realized that infant and child mortality result from the combined effects of nutritional deficiencies, infections, parasitic and respiratory diseases. As malnutrition and infection go hand in hand, we need to improve the nutritional status by promoting exclusive breast feeding in the initial 6 months, proper complementary feeding thereafter, hygiene and sanitation, parental education and early health seeking for proper treatment. Therefore, there is need to integrate the people's beliefs, awareness, attitudes and behavioural practices into health promotion programmes to achieve a maximum reduction in child and infant morbidity and

mortality. Unless this is done, there might not be too much progress as regards reduction of infant and childhood morbidity and mortality in India. Also, health intervention programmes such as integrated management of neonatal and childhood illnesses (IMNCI) which have been shown to reduce childhood deaths significantly need to be intensified in order to achieve the MDG by 2015.

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Table 1: Total no of admissions and deaths during the study period in each age group

Age group	Death	Survival	Total admission
29 day to 1 year	546(6.02%)	8519(93.98%)	9065
>1-3years	194(3.95%)	4715(96.05%)	4909
>3-5years	79(4.35%)	1735(95.65 %)	1814
Total	819(5.19%)	14969(94.81%)	15788

Table-2 : Distribution of deceased children by Nutritional Status and Age Group

Distribution of deceased children by Nutritional Status and Age Group								
Nutritional Status	Age Group						Total	
	29day to 1 year		> 1 - 3 Year		>3 - 5 Year			
	No.	%	No.	%	No.	%	No.	%
Normal	298	54.6	78	40.2	21	26.6	397	48.5
Acute Malnutrition	230	42.1	69	35.6	27	34.2	326	39.8
Chronic Malnutrition	2	.4	11	5.7	9	11.4	22	2.7
Acute on Chronic malnutrition	16	2.9	36	18.6	22	27.8	74	9.0
Total	546	100.0	194	100.0	79	100.0	819	100.0

Table 3: Cause of death (diagnosis)

Diagnosis	Number of death	Percentage
Septicaemia	217	26.5
Acute Respiratory infection & Complications	192	23.4
CNS Infection	137	16.7
Heart diseases	92	11.2
Severe Malaria	58	7.1
Others	46	5.6
Liver Diseases	24	2.9
Malignancy	14	1.7
SAM with Complications	11	1.3
Acute Gastroenteritis	11	1.3
Nephrotic Syndrome	8	1
Status Asthmaticus	4	0.5
Measles with complications	3	0.4
HIV	2	0.2
Total death	819	100