A cross-sectional study to assess acute malnutrition among under-5 children in the field practise area of a teaching hospital in Chennai

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Abstract

Context: Malnutrition is one of the leading problem mainly in childhood especially under 5 years of age. According to NFHS-4, under-5 children about 27% are stunted, 20% are wasted and 24% are underweight. Determining acute malnutrition (wasting) and its factors is necessary to prevent complications. Aims: To assess acute malnutrition among under 5 years children and determine associated factors responsible. Settings and Design: Cross-sectional study done at field practice area under a teaching hospital in Chennai. Materials and Methods: Totally, 149 children under 5 years of age were selected and assessed for acute malnutrition using WHO standards (Z-scoring) by calculating weight for height. Questionnaire for checking associated factors was used. Statistical Analysis Used: Data were entered in excel spreadsheet and analyzed using SPSS software version 16 and for inferential statistical analysis was done using Chi square test. Result: Among the study population, 87.2% children were normal, 10% of children had wasting (below -2 S.D.) and 2.8% of children had severe wasting (below -3 S.D.). Wasting was also prevalent among people of low socioeconomic class and was maximum in children of age group 1-3 years. Low birth weight, absence of exclusive breast feeding and complementary feeding practices, partial immunization and other illnesses also had effect, leading to acute malnutrition. Conclusion: Level of acute malnutrition in the field practice area is lesser than the national average and determines few factors associated with malnutrition among under – 5 children.

Keywords: Acute malnutrition, children, factors, wasting, WHO standard

Introduction

Malnutrition is leading problem among childhood especially under-5. Malnutrition can be defined as, deficient or excess nutrient intake, imbalance of nutrients or impaired utilization of nutrients.[3] According to NFHS-4, under-5 children about 27% are stunted, 20% are wasted and 24% are underweight in Tamil Nadu.[3] WHO says, 45% of child deaths is associated with under nutrition and 47 million children under 5 years are wasted.[3] Under nutrition among malnutrition has three factors; underweight, stunting and wasting.[3] Acute malnutrition can be detected by checking wasting (weight for height). Hence this study is done aiming to assess acute malnutrition.

Materials and Methods

This cross-sectional study was done at field practice area under a tertiary care hospital in Chennai, India from January 2020 to March 2020. Sample size was about 149 children wherein the prevalence was calculated from a study done by Gopinath TT.[4] Children with birth defects, physical inabilities, congenital anomalies, etc., and those who didn’t consent for participation were excluded.

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Also children aged less than 6 months were excluded. The Under – 5 children register maintained by peripheral health center of the tertiary care centre, was used to check for the address of under – 5 children and participants were selected using convenient sampling except those who met exclusion criteria. Weight for height according to age of children under-5 will be measured and analyzed for wasting using WHO standards [Z-scoring] for acute malnutrition. Wasting is less than -2 S.D. for weight for height and severe wasting is less than -3 S.D. Parents were asked about other associated factors such as family type, socio-economic class using Modified BG Prasad socio-economic classification- 2019, birth weight, immunization status, breast feeding, complementary feeding and acute illnesses such as loose stools, cough with fever, worm infestation, anemia, vitamin deficiency, dehydration and any other known illnesses , using a questionnaire which was semi-structured and pre-validated. Children less than 2.5 kg were considered low birth weight; breast feeding till 6 months was considered exclusive breast feeding and complementary feeding started from 6 months was taken as appropriate according to WHO. All parents participated have offered Informed consent. The participants were informed that the data collected will be maintained as confidential. The approval of ethical committee was done before starting. Approval from ethics committee was obtained on 17/03/2020 Data was evaluated in SPSS software version 16 by entering in excel spreadsheet and for inferential statistical analysis was done using Chi square test and likelihood ratio was used if more than 20% of cells had value less than 5. Ethical clearance was obtained from institutional ethical clearance board.

**Result**

**Socio-demographic factors**

**Sex**

In the present study, a total of 149 under-5 years of age children were included in the study, out of which 68 [45.7%] were male and 81 [54.3%] were female children. Wasting referring to acute malnutrition, calculated using WHO z-scoring [weight for height], was present in 3% of the male children, whereas 16% of female children presented with wasting and 5% of female children had severe wasting [Refer Table 1].

**Type of family and socio-economic class**

About 34 families [23%] belonged to joint family and 115 families [77%] belonged to nuclear family on total, among which 4 children from joint family were wasted, and 11 children and 4 children from nuclear family were wasted and severely wasted. 2 children belonged to class 2, 34 children belonged to class 3, 90 children belonged to class 4 and 23 children belonged to class 5 of socio-economic class according to Modified BG Prasad socio-economic classification- 2019. Acute malnutrition; wasting was found in 6% children among class 3, 10% of children among class 4 and 17.4% children among class 5. Severe wasting was found in 4.4% of children in class 3 [Refer Table 1].

Thus, about 15.3 percent were wasted in the age category of 1–3 years and 4.3 percent in the age category of 3–5 years. While among 15 children in the age 7–12 months, 2 children were severely wasted and among 85 children between the age group 1–3 years, 2 children were severely wasted [Refer Table 1].

**Overall**

Weight for height, evaluated by z-scoring which indicates acute malnutrition among children below 5 years, concludes that, 87.2% among 149 children were normal overall, 10% of children had wasting [below -2 S.D.] and 2.7% of children had severe wasting [below -3 S.D.] [Refer Figure 1].

**Associated factors**

**Birth weight**

At time of birth, about 132 children [88.6%] had normal birth weight, whereas other 17 children [11.4%] belonged to low birth weight category. Among them, 35.3% [6 children] were wasted [Refer Table 2].

**Breast feeding**

Exclusive breast feeding till 6 months was given for 138 children. Whereas it was not done for the other 11 children which constitutes about 11. Wasting was present in about 4 [36.4%] children who were not exclusively breast fed till 6 months [Refer Table 2].

**Immunization**

About 81.4% were completely immunized till the respective age according to national immunization schedule. But the other 18.6%, consisting 28 children were only partially immunized. Among the 28 partially immunized children, 4 children [14.3%] had wasting and 2 children [7.1%] had severe wasting [Refer Table 2].

**Complementary feeding**

**Figure 1: Overall acute malnutrition [wasting] in under 5 years children; N = 149**

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One thirty-two children among 149 children, which is about 88.6%, were started with complementary feeding by 6 months. Other 11.4% [17 children] were not started by 6 months. Among the children, were in complementary feeding was not started, 2 children [11.8%] had wasting and 4 children [23.5%] had severe wasting [Refer Table 2].

**Other illnesses**

In the past 3 months, loose stools were present in 19 children and in 4 dehydration also occurred. 38 had cough with fever at least one time in the last 3 months and 21 children had worm infestation. Though, wasting was present in: 21% who had loose stools, 50% among children who were dehydrated, 10.5% among children who had cough with fever in the past 3 months’ time. Severe wasting was present in 5.3% of children who had cough with fever. No signs of wasting were seen in children with worm infestation. History of anemia and vitamin A deficiency were asked and were not present in any children [Refer Table 2].

From Table 2, it is noted that birth weight, breast feeding, complementary feeding and illnesses in the past 3 months

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**Table 1: Socio-demographic factors and acute malnutrition; n=149**

| SOCIO-DEMOGRAPHIC FACTOR | ACUTE MALNUTRITION [WASTING] | TOTAL [n=149 [100%]] |
|---------------------------|-------------------------------|-----------------------|
|                           | No wasting [n=130 [87.2%]]   | [Wasted children [< -2 S.D] [n=15 [10%]] | Severely wasted children [< -3 S.D] [n=4 [2.8%]] |
| SEX                       |                               |                       |                                                   |
| Male                      | 66 [97%]                      | 2 [3%]                | 0 [0%]                                          | 68 [100%] |
| Female                    | 64 [79%]                      | 13 [16%]              | 4 [5%]                                          | 81 [100%] |
| TYPE OF FAMILY            |                               |                       |                                                   |
| Nuclear family            | 100 [87%]                     | 11 [9.6%]             | 4 [3.4%]                                        | 115 [100%] |
| Joint family              | 30 [88.2%]                    | 4 [11.8%]             | 0 [0%]                                          | 34 [100%] |
| SOCIO-ECONOMIC CLASS      |                               |                       |                                                   |
| Upper class               | 0 [0%]                        | 0 [0%]                | 0 [0%]                                          | 0 [100%]  |
| Upper middle class        | 2 [100%]                      | 0 [0%]                | 0 [0%]                                          | 2 [100%]  |
| Middle class              | 32 [94%]                      | 2 [6%]                | 0 [0%]                                          | 34 [100%] |
| Lower middle class        | 77 [85.6%]                    | 9 [10%]               | 4 [4.4%]                                        | 90 [100%] |
| Lower class               | 19 [82.6%]                    | 4 [17.4%]             | 0 [0%]                                          | 23 [100%] |
| AGE                       |                               |                       |                                                   |
| 6 months                  | 2 [100%]                      | 0 [0%]                | 0 [0%]                                          | 2 [100%]  |
| 7-12 months               | 13 [86.7%]                    | 0 [0%]                | 2 [13.3%]                                       | 15 [100%] |
| 1-3 years                 | 70 [82.3%]                    | 13 [15.3%]            | 2 [2.4%]                                        | 85 [100%] |
| 3-5 years                 | 45 [95.7%]                    | 2 [4.3%]              | 0 [0%]                                          | 47 [100%] |

**Table 2: Acute malnutrition and associated factors; n=149**

| Association factor | ACUTE MALNUTRITION [WASTING] | TOTAL [n=149 [100%]] | P |
|-------------------|-------------------------------|-----------------------|---|
|                   | No wasting [n=130 [87.2%]] | [Wasted children [< -2 S.D] [n=15 [10%]] | Severely wasted children [< -3 S.D] [n=4 [2.8%]] |
| BIRTH WEIGHT      |                               |                       |                                                   |
| Normal            | 119 [90.2%]                   | 9 [6.8%]              | 4 [3%]                                          | 132 [100%] |
| Low birth weight≤2.5 kg | 11 [64.7%] | 6 [35.3%]              | 0 [0%]                                          | 17 [100%]  |
| BREAST FEEDING    |                               |                       |                                                   |
| ≥6 months [exclusive breast feeding] | 123 [89.1%] | 11 [8%]                | 4 [2.9%]                                        | 138 [100%] |
| <6 months         | 7 [63.6%]                     | 4 [36.4%]             | 0 [0%]                                          | 11 [100%]  |
| IMMUNIZATION      |                               |                       |                                                   |
| Completed         | 108 [89.3%]                   | 11 [9%]               | 2 [1.7%]                                        | 121 [100%] |
| Partially completed | 22 [78.6%] | 4 [14.3%]              | 2 [7.1%]                                        | 28 [100%]  |
| COMPLEMENTARY FEEDING |                       |                       |                                                   |
| By 6 months       | 119 [90.2%]                   | 13 [9.8%]             | 0 [0%]                                          | 132 [100%] |
| Delayed           | 11 [64.7%]                    | 2 [11.8%]             | 4 [23.5%]                                       | 17 [100%]  |
| OTHER ILLNESSES IN PAST 3 MONTHS |             |                       |                                                   |
| No illnesses      | 60 [89.6%]                    | 5 [7.5%]              | 2 [2.9%]                                        | 67 [100%]  |
| Loose stools      | 15 [79%]                      | 4 [21%]               | 0 [0%]                                          | 19 [100%]  |
| Dehydration       | 2 [50%]                       | 2 [50%]               | 0 [0%]                                          | 4 [100%]   |
| Worm infestation  | 21 [100%]                     | 0 [0%]                | 0 [0%]                                          | 21 [100%]  |
| Cough with fever  | 32 [84.2%]                    | 4 [10.5%]             | 2 [5.3%]                                        | 38 [100%]  |
were statistically significant with acute malnutrition except immunization because \( P \) value is \( >0.05 \).

**Discussion**

Proper nutrition is necessary for growth and development at young age. This is affected by malnutrition which leads to mortality and morbidity consequences. Though the prevalence of malnutrition has been reduced over the years, it still persists as one of the leading etiology for many threatening conditions. Looking for etiology and treating children by primary care physicians at its acute stage by checking wasting and advising on correcting nutritional deficiencies is essential to prevent complications at all levels of prevention.

This study shows that, out of 149 children 10% of children had wasting and 2.7% had severe wasting overall. It is observed that, this value is lesser than the percentage according to NFHS-4 survey, which says prevalence of wasting in under five age children is about 20% in Tamil Nadu. This shows that the National Programs are being implemented well in the field practice area. Another study done by Gopinath TT, on Assessment of nutritional status of children aged under-five years in tribal population of Jawadhu hills in Tamil Nadu, concludes that, 10.4% children had wasting and 1.9% children were severely wasted. Another study done by Sanjit Sarkar; Cross-sectional study of child malnutrition and associated risk factors among children aged under five in West Bengal, India, states that wasting was present in 22% children.

In the study, it is found that female children were wasted more than male children. A study done by Sinha RK, concludes that odds of wasting among male children were significantly higher compared to female children. It is also found that children of socioeconomic class 4 and 5 have more percentage of wasting. A study done by Anuradha R, Sivanandham R says that as socioeconomic status increased, malnourishment decreases which is statistically significant. Thus, lower socioeconomic group have more chances of wasting. Dhakal MM et al., mentioned that 82.75% children from low income group are malnourished.

According to age factor, 1 to 3 year old children were more affected followed by 3 to 5 years. Kavitha et al. reported in her study that malnutrition was higher in 3 years period than 4th and 5th year. Another study also concluded that, malnourishment increases as age increases. A study done by Avachat et al., states that low birth weight babies are more prone to under nutrition. In this study, 37.5% of low birth weight children were wasted. Thus it is significant that low birth weight has an impact on nutrition of children. Poor children with low birth weight and illiterate mother had severe forms of malnutrition, sates a study. In children, were exclusive breast feeding was not done, 36.4% of them developed wasting. Also, in children who were partially immunized, 14.3% of them had wasting and 7.1% were severely wasted but was statistically not significant. Thus immunization as a factor for wasting was not significant.

In similar study, by Biswas et al. shows, improper immunization and not practicing exclusive breast feeding were found to be significantly associated with under nutrition. It is also seen that immunization associated with acute malnutrition is statistically insignificant in a study done by Gopinath TT. It is also seen that, among children who were not started with complementary feeding at sixth month, 11.8% were wasted and 23.5% were severely wasted. Thus complementary feeding also has minor contribution for wasting. Children starting their complementary food at the age of 6 months have less risk of being wasted.

In this study, wasting was also observed in children who had illnesses such as loose stools, dehydration, and cough with fever in the past 3 months. Diarrhoea is a major cause of malnutrition and mortality in under five children says WHO. Also another study about the relation between severe acute malnutrition and infection says that malnutrition is associated with infections, and death amongst children is mostly due to infection in severely malnourished children. Also, HIV, diarrhoea, pneumonia and low levels of weight for height- z score leded to mortality in severe acute malnourished children; concludes a study.

**Conclusion**

Malnutrition is being one of the common condition which also leads to various complications in children in future. This study clearly ensures presence of acute malnutrition; wasting is present among 10% wherein 2.7% were severely wasted using WHO standards. Thus, early identification and intervention as soon as possible is important. Also, from this study, creating knowledge and awareness among people for proper immunization, exclusive breast feeding and complementary feeding practice, maintaining proper hygiene to prevent illnesses etc., are important as these are also associated factors which is leading to acute malnutrition. Necessary measures should also be taken for the public, for the improvement of socioeconomic status and nutrition status as it also contributes to malnutrition.

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**Conflicts of interest**

There are no conflicts of interest.

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