RETROSPECTIVE STUDY ON OUTCOME OF IN-PATIENT TREATMENT OF SEVERE ACUTE MALNUTRITION IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL FROM SEPTEMBER 2011-SEPTEMBER 2012

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ABSTRACT

Background: Malnutrition often affects young children and contributes to more than 60% of deaths in children in developing countries. Aggressive hospital based management of sever acute malnutrition is recommended to meet the acceptable standards regarding outcome of the treatment. This study aimed to assess the treatment outcome of severely malnourished children treated in Jimma university specialized hospital (JUSH). Methods: Retrospective reviews of charts of severely malnourished children admitted at JUSH from September 2011 to September 2012 were made. In this study, a total of 173 cards were selected using systematic sampling technique. The numbers of discharges cured, defaulted, and average length of stay in days (d) were reviewed. Multivariate logistic regression was applied to identify and control potential confounders. P-value < 0.05 was considered significant. Results: Of 173 cases of malnutrition, 53.2% (92) had kwashiorkor and 30% (52) were Marasmic cases. Of the total, 87% (152) were cured while 5.8% (10) had died. The average length of stay was around 21 days. The study revealed significant association between age distribution and type and outcome of malnutrition. Association is also evident between presence of associated medical illness and duration of stay (p < 0.05). Conclusion and recommendation: In conclusion, the overall recovery, defaulter and mortality rates were within the acceptable range of sphere standards. Thus, the in-patient program was effective. However, more should be done to improve treatment outcome along with duration of stay by working aggressively on management of medical associated problems.

Keywords: Sever acute malnutrition, Treatment outcome.

Contribution/ Originality

CM conceived and designed the study. He also wrote the paper. MT. MM and AD contributed in the conduct and analysis of the study. All of the authors have read and approved the manuscript.

1. INTRODUCTION

Severe Acute Malnutrition (SAM) caused by inadequate intake of nutrients, is a syndrome that result in weight-for-height ratio of less than −3 standard deviations below the median reference population or weight-for-height ratio of below 70% or presence of nutritional edema [1-3]. The immediate causes of malnutrition and child death are mutually reinforcing conditions of inadequate dietary intake and infectious disease; the underlying causes are household food insecurity, inadequate health service and absence of healthy environment. The basic causes include formal and informal institutions: political, economic and ideological structure and system. Malnutrition can affect all age groups, but is more frequent among infants and young children (4 years); it is linked to increased risk of death in children, and reduces the learning ability, school performance and retention rate. Malnutrition contributes to 50 - 60% of deaths in children for which infection is the underlying cause [4, 5]. In developing countries, significant numbers of children are suffering from severe acute malnutrition. In India, 2.8% of children under five are severely wasted [4]. In 2003, the United Nations children's Fund (UNICEF) estimated sixty thousand children to be severely malnourished in Ethiopia [6]. In children younger than five years of age, according to the Ethiopian Demographic and Health Survey (EDHS) report, 47% were stunted, 11% wasted, 2% severely wasted 38% underweight (below -2SD) and 16% severely underweight (below -3SD) [7]. In the Southern Nations, Nationalities and Peoples' Region (SNNPR), 52% of children were stunted, 6.5% wasted and 34.7 % underweight [7]. Similarly, according to a household survey in 2003 by Essential Services for Health in Ethiopia (ESHE)/USAID, among children from 12 - 24 months, 48% were stunted, 42% were underweight, 11% had moderate to severe malnutrition and 2% severe malnutrition [8]. Because of the poor outcome related to traditional treatment, hospitalized management of severely acute malnutrition is recommended. The traditional method used to treat severe malnutrition in hospitals in Ethiopia involves administering "kwash" and "marasmic" milk (locally prepared by mixing cow's whole milk, oil, raw egg, sugar, iron and potassium chloride). Under traditional treatment, deaths as high as 20-40% were reported from developing countries [4-8]. Michael Golden and his colleagues came up with the free radical theory of edematous malnutrition (kwashiorkor) which stated that it results from excessive toxic products resulting in the generation of sufficient reactive oxidative free radicals (which should normally be balanced by similar rate of their consumption by antioxidants) to exceed the host's antioxidant capacity (the capacity to consume reactive oxidative free radicals). In short, edematous malnutrition occurs due to the imbalance between production of free radicals and their safe disposal. They described

wasting as a result un-replaced pathological loss of nutrients or infection and recommended to manage children with severe malnutrition using therapeutic products, formula milk (F75 and F100) which contain essential nutrients (minerals, vitamins, proteins, energy) and used drugs to treat infections (Ampicillin, Vitamin A, Mebendazol and Folic acid) in TFC [9]. Therefore, this paper assessed treatment outcome of malnourished children admitted to Jimma university specialized hospital (JUSH).

Objective: The study aimed to assess the treatment outcome of severely malnourished children treated in Jimma university specialized hospital (JUSH).

2. METHODS AND MATERIALS

Study area and period: The study was conducted at Jimma university specialized hospital, one of teaching hospital which is located in Oromia region, Jimma zone; at Jimma town. Jimma town is located at about 346km, south west of Addis Ababa. The teaching hospital serves as referral hospital covering south western part of the country serving for about 10.5million people within the catchments area about 250km radius. Jimma university specialized hospital is one of the centers which give therapeutic feeding as in-patient around Jimma zone according to national guideline. The study was conducted from october1 to 20/2012.

Study design: Retrospective cross-sectional study was applied for conducting this study.

Populations: All patients card admitted to JUSH pediatrics wards with a diagnosis of SAM for a period of one year (from September 11/2011 to September 10/2012) were reviewed.

Sampling size and sampling procedure: The sample size for this study is calculated based single population formula by considering 5% marginal error and prevalence of 50%.

n = $\underline{Z^2PQ/d^2}$, where;   n=minimum sample size, Z is the level of significance corresponding to 95% confidence interval (1.96), P= (0.5) to get maximum sample size, Q=1-p and d=margin of error derived at 5% (.05)

$\boldsymbol{n}$ =384

Since the study population is <10,000 which is 318, n needs to be corrected as;

$\boldsymbol{nf}$=n/1+n/N, where nf-corrected sample size=$\underline{\textbf{173}}$

By applying systematic sampling technique, every other patient's cards was reviewed alternatively.

Variable and measurement: Dependent variables include the following,

- Recovery rate
- Default rate
- Death rate
- Duration of stay
- Time of death

The independent variables included;

- Age

- Sex
- Admission criteria
- Diagnosis of malnutrition
- Immunization status
- Sero-status
- Associated illness

Data collection method and instrument: Reviews of patient card were made. Trained nurses made document review using structured checklist.

Data Entry, Cleaning and Analysis: The numbers of discharges cured, defaulted, and average length of stay in days (d) were reviewed. The cure and death rates were calculated as the number of malnourished children cured or died of the total admitted expressed in percentage. Average lengths of stay were calculated for recovered patients as the number of days for each recovered patient over the number of recovered patients, respectively. The data was cleaned, coded and entered to SPSS version 17 for analysis. Frequencies, percentages, cross tabulation, Odds ratio of different variables were determined. Multivariate logistic regression was applied to identify and control potential confounders. P-value < 0.05 was considered significant.

3. OPERATIONAL DEFINITION

Marasmus: is defined as weight for age below 60%of the Hardvard standard

Kwashiorkor: is wt/age between 60%and 80%of the Harvard standard with edema.

Recovery: is defined as discharge when the patient attained >85and %of W/H and when edema and major medical complication subsided.

Defaulter: when the patient discontinued before recovery

Death: Patients who died after admission of to the hospital.

Length of stay: is the number of days the patient stayed in the ward starting from the day of admission to the day of discharge.

Rural: As those living in localities with less than 2,000 people.

Ethical consideration: Official letters from JUSH were sent to department of pediatrics and child health. The type and contents of patient's information were kept confidential.

4. RESULT

4.1. Socio-Demographic Characteristics

A total of 173 cards were reviewed and considered for analysis. Out of the total participants, 105 (65%) of them were males. Around 90 (52%) and 83 (48%) of subjects were from urban and rural areas respectively. Their age ranges from 10 days to 14 years with a mean age of 41.4 months. when we see their age distribution ,the most frequent once were those between 25-60 month with 65 (37.6%) score followed by 7-24 months with 50 (28.9%) share (Figure-1).
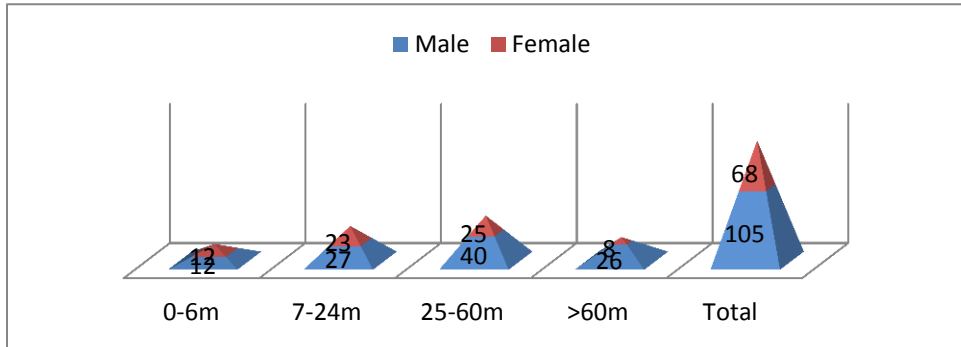
Figure-1. Age and sex distribution of patients admitted with SAM in JUSH pediatric ward from September 2011 to September 2012

4.2. Admission Criteria

The most used admission criteria was bilateral pitting edema with a score of 118 (68.2%) followed by Wt/Ht and MUAC with value of 28 (16.2%) and 27 (15.6%) respectively.

4.3. Type of Malnutrition

Regarding the type of malnutrition, the most frequent one was kwashiorkor with magnitude of 92 (53.2%) followed by marasmus with 52 (30.1%) and marasmickwashikor which constituted 19 (11%) of cases (figure 2).
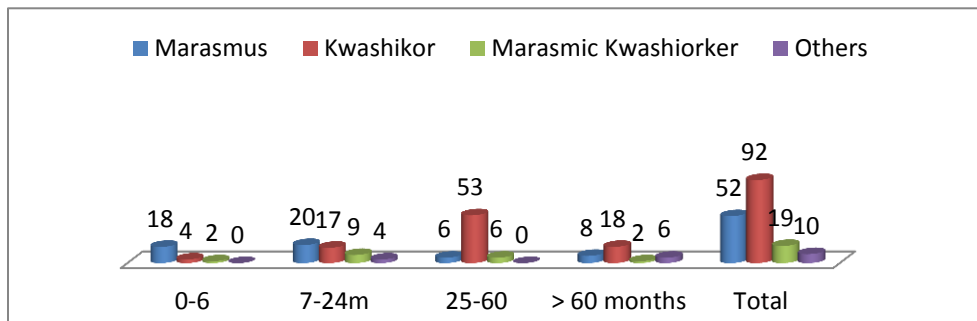

Fig-2. Type of malnutrition by age category among patients admitted with SAM at JUSH pediatrics wards from September 2011 to September 2012

4.4. Immunization and Sero-Status

As to their immunization status, majority, 151 (87.3%) were fully immunized. One fourth, 44(25.4%)of participants have unknown sero-status. The sero-status for HIV showed that most, 116(87.3%) are non-reactive .The remaining 7 (4%) and 6 (3.5%) were sero-positive and HIV exposed respectively.

4.5. Presence of Associated Medical Problems

From all cases 113(67.1%)have associated medical problem with SAM at presentation; out of which the most common were ,diarrhea, TB and pneumonia with rates of 29 (25.7%), 28 (25%) and 19(16.8) respectively.

4.6. Outcome of Treatment

Concerning the status of their treatment outcome; 152(87.3%) of cases have recovered. Defaulter rate of 12(6.9%) and death rate of 10(5.8%) were recorded. The cause of death was almost sepsis for all of them. The case fatality rate for marasmic-kwashikor was 2(10.5%) and 4.3% for kwashikor only (table-4). Most deaths, 6(60%) occurred after 10 days of stay at the ward. Most, 8(80%) of deaths happened at phase-1.See figure 3 and table 1 below.
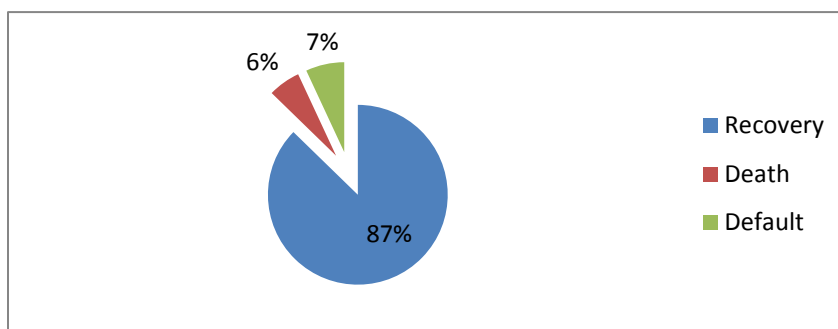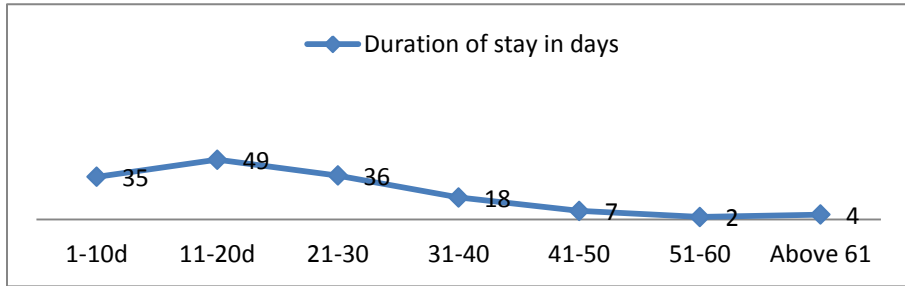

Fig-3. Outcome of patients admitted with SAM at JUSH pediatric wards from september2011 to September 2012.

Table-1. Type of malnutrition and outcome of patients admitted with SAM at JUSH pediatric wards from September 2011 to September 2012.

Type of malnutrition	outcome						total	
	Recovery		Death		Default			
	Freq	%	Freq	%	Freq	%	Freq	%
Marasmus	41	78.8	4	7.7	7	13.5	52	100
Kwashikor	86	93.5	4	4.3	2	2.2	92	100
Marasmic kwashiorkor	16	84.2	2	10.5	1	5.3	19	100
Other	8	80	0	0	2	20	10	100
Total	151	87.3	10	5.8	12	6.9	173	100

4.7. Duration of Stay and Recovery

When we see the duration of edema subsided, majority, 99(86.6%) of patients have their edema subsided with in less than ten days. The median time for edema to subside was 10 days. The duration of stay for the recovery was less than 30 days in 90(80%) of cases. The mean day for recovery was 22 days after admission (figure 4).

Figure-4. Duration of stay for recovery among patients admitted with SAM at JUSH pediatrics ward from September 2011 to September 2012

4.8. Presence of Associated Problems and Outcome of Treatment

From the total patients having associated medical problem, 27(28.2%) of them stayed more than 30 days for recovery while only 4(7.2%) of cases without associated medical illness had stayed more than 30 days.

Table-2. Presence of associated disease & outcome of patients admitted with SAM at JUSH pediatric wards from September 2011 to September 2012.

Presence of associated disease	outcome						Total	
	Recovery		Death		default			
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	95	81.9	10	8.6	11	9.5	116	100
No	56	98.2	0	0	1	108	57	100
Total	151	87.3	10	5.8	12	6.9	173	100

4.9. Medical Complication during Admission

Out of all study patients, 30(17.3%) had developed noso-comial complication after admission. From all marasmickwashikore patients, 3(15.8) developed medical complication. 8(15.3%) &13(14.1%) of patients with marasmus and kwashikor developed complication respectively

4.10. Factors Associated with Malnutrition

Multivariate logistic regression model, showed a significant (with p-value of .0001) association between age distribution and type of malnutrition. The most frequent age group for marasmus, kwashiorkor, marasmickwashikor was 7-24,25-60 month of age respectively. The age distribution has significant association with the outcome (with p-value of .009). There was no significance (with p-value.162) association between type of malnutrition and duration of stay. Only presence of associated medical illness showed significant association (with p-value of 0.038) with duration of stay.

5. DISCUSSION

With regard to socio-demographic feature, this study revealed that significant variation in sex distribution (60.7% males versus 39.3%) females. When we see the age group distribution, about 80% of them were under five children, which is said to be vulnerable age group for malnutrition.

The study revealed that the defaulter and mortality rates were within the acceptable international sphere standards. The overall mortality rate (5.8%) is well within the minimum sphere standard (<10%); but it is slightly higher than similar studies conducted in Jimma and Arbegona, Ethiopia [10-12].

The rates of recovery from SAM among the children under this study were 87%. . The median recovery time was 3 weeks. More than 90 % of children recovered from SAM at less than 8 weeks. Likewise, to reach the minimum sphere standard recovery rate, set at 75%, the children demanded less than four weeks to stay under the treatment, which was in line with the standards. This is supported by the standard that outlined less than 8 weeks is sufficient for the children without medical co morbidities and to those who received routine medications to recover from SAM. This may be due to the fact that the mode of treatment was inpatients and the hospital is a teaching hospital with satisfactory capacity and experience in malnutrition management

The defaulter rate in this study is within the acceptable range of the international standard. This is contained in the domain of global sphere standards. The children with medical co morbidities were defaulting at much higher rate. The overall defaulter rate (around 7%) in this study is comparable as compared to similar study conducted on RUTF based therapeutic feeding program in Maradi-Niger, Darfur-Sudan, Bedawacho-Ethiopia and Arbegoba-Ethiopia [12-15]. This might be because the therapeutic feeding program in Maradi and Darfur was introduced in response to emergency (hunger gap) and might get especial focus. These programs, similar to in-patients treatment schemes confirmed the presence of a caregiver and watched the child consume Plumpy'Nut in addition to the full medical examination [14]. Moreover, the caregivers in those areas could adhere to the treatment since other foods are scarce at home during famine [13]. This result signifies that applying strict follow ups on the children under treatment could result to better outcomes.

The average length of stay was 3 weeks (21 days). This is within the acceptable minimum international standard (<28 days) [16]. It is also within the standard of the Ethiopian protocol for management of SAM that allows children to stay under treatment to utmost 8weeks (64 days) [15]. This length of stay is better than other similar studies of OTP outcomes evaluation conducted in Jimma-Ethiopia (37.5 days), Bedawacho-Ethiopia (42 days) and Maradi-Niger (42.6 days) [13, 15, 17-19]. This is largely because of the high quality of care and strict treatment follow up during in-patients treatment scheme provided at hospital level.

More than 15% children had developed medical complication. This may be largely due to their poor immunity to prevent noso-comial infection. This may also be due to small bowel

bacterial overgrowth and parasitic infections occur commonly in SAM cases [16, 20]. The severely malnourished children are also the most harbors of parasites that can directly consume nutrients and/or deter the absorption. Hence, these infections are recommended to be treated blindly [19].

This study revealed significant association between age distribution and type and outcome of malnutrition. This association is also evident between presence of associated medical illness and duration of stay.

6. CONCLUSION AND RECOMMENDATION

In conclusion, the overall recovery, defaulter and mortality rates were within the acceptable range of sphere standards. Thus, the in-patient program was effective. However, more can be done to improve the above situation along with duration of stay by working aggressively on management of associated medical problems.

6.1. Limitation of the Study

The fact that the study is a cross-sectional one which involves record review resulted in chicken- egg dilemma as well as incompleteness of some important patient information.

7. ACKNOWLEDGMENTS

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