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A Review Study on the Effectiveness of Nutrition Rehabilitation Centers in the Field of Severe Acute Malnutrition

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ABSTRACT: Child mortality is the major problem faced by all the developing countries and Severe acute malnutrition is the major cause of all the mortality and morbidity in children under the age of five years. Government has started lots of programmes regarding nutritional care of mother & child in order to improve their nutritional status. Nutrition Rehabilitation Center is one of them. This center is only for severely acute malnourished children of 0-5 years. Nutrition Rehabilitation Center has been developed with the aim to enhance the status of nutrition of children through provision of quality health services and nutritional care to children under the age of 5 years. To conclude this study, we reviewed many national and international researches spanning over a year to assess the effectiveness of Nutrition Rehabilitation Center in the field of Severe Acute Malnutrition. Secondary data has been used to perform this synthetic review. The source of this data is mostly online data base like Google, Pub Med, Research Gate etc. We searched articles which were based on Nutrition Rehabilitation Center, Severe Acute Malnutrition, child malnutrition, mother and child malnutrition etc. We conducted a detailed review of all papers, articles and reports on the bases of inclusion and exclusion criteria. Nutrition Rehabilitation Center is a government initiative towards Severe Acute Malnutrition. It's helpful to combat malnutrition. Therapeutic diet F-75, F-100 are showed positive results on Severe Acute Malnutrition children. Nutrition Rehabilitation Center plays an effective role in combating Severe Acute Malnutrition in our community, but lack of awareness plays a negative impact on programme as well as on community health.

Keywords: Nutritional rehabilitation center, Severe Acute Malnutrition, Under nutrition, Community based nutrition programme, Malnutrition.

INTRODUCTION

Child mortality is the major problem faced by all the developing and underdeveloped countries; India is also not untouched with this problem. As per Global Hunger Index (GHI) 2022, India is ranked at 107th out of 121 countries. One third of the stunted children worldwide belong to India. Due to this India loses 4% of its GDP annually. Thus, we observe that the objective of inclusive development cannot be met without eliminating this chronic problem. Even the United Nations has acknowledged this issue and have included this in its Sustainable Development Goals. Target 3.2 of SDG2 talks about ending all preventable deaths under 5 years of age.

The major reason for malnutrition in India is poverty and lack of awareness. As we know that a majority of our population lives on bare minimum. So having access to proper health care services, especially prenatal and neonatal care is rare for them. They seek expert's suggestions only in case of any abnormalities or unusual conditions. Also, education is another determinant of malnutrition in India or anywhere else. Lack of education and awareness regarding the health often leads to abnormal growth among babies and sometimes even lead to death.

Malnutrition in children is a chronic health issue and a severe challenge for the public administration in our country. The 1st National Family Health Survey (NFHS-1) which was conducted in 1992-1993 found that India was in the list of worst performing countries on several child health indicators. This survey mentioned that more than 50 percent of the children under four were underweight and stunted. One in every 6 children was wasted.

Stunted children are too short for their age group according to WHO child growth standards (chronic malnutrition). Wasting is (acute malnutrition) resulting from failure to gain weight or actual weight loss and micronutrients deficient (essential vitamins and minerals). Severe Acute Malnutrition (Severe Acute Malnutrition) is a major factor for most deaths amongst children accounting for under-five child mortality.

Protein Energy Malnutrition (PEM): The World Health Organization (WHO) defines PEM as a range of pathological condition arising from coincidental lack in varying proportion of protein and calories, occurring

most frequent in infants and young children, and commonly associated with infection.

After a long-time efforts and investments to tackle this malaise, India's child malnutrition rates are still one of the worst. The Global Hunger Index (2020), calculated on the basis of total undernourishment of the population, child stunting, extremely thin child and child death places India at the 94th rank among list of one hundred seven countries. And this rank deteriorated in 2022, as according to GHI 2022, India was ranked at 107th position among 121 countries. Which shows that we need do scale up our efforts and investment in order to fully eliminate this malaise.

The scourge of child and mother malnutrition is responsible for 15% of India's total diseased population. The fourth round of NFHS (2015-2016), found that the prevalence of underweight, stunted and wasted children under the age of five was at 35.7, 38.4 and 21.0 % respectively.

Malnutrition in a child is a mix problem that requires a comprehensive approach. The public administration and service delivery systems, as well as engagement from the community.

Fifth NFHS (2019-20) shows worse condition of nutritional status of under the five-year children. Chronic malnutrition has increased in eleven states out of 17 states. The number of severely thin child has become more in 13 states. Stunted child more prone to any kind of infection, diseases or illness.

The number underweight children (low weight with respect to age) have increased in eleven out of 17 states. More than 40% of the children under the age are underweight in state Bihar and Gujarat.

At the basis of an article published on World Health Day, a child who born in India April 7, 2021 will live for at least 69 years and four months, on the basis of recent India life expectancy, the SRS-based Abridged Life Table 2014-18 of the Census and Registrar General of India. This is less than the world's average life span of 72.81 years.

Children in Uttar Pradesh and Madhya Pradesh, if born today, may not live more than 65 years and 66 years respectively (Pandey, 2021).

If we look at a worldwide data, the Severe Acute Malnutrition is estimated to be around 1-2 percent in developing countries. Severely malnourished child has 9 times higher chances of death in comparison of well-nourished child.

Uttar Pradesh (UP) is a very large state of India. This state has one of the highest malnutrition children's populations in the worldwide.

The Uttar Pradesh State Nutrition Mission (2014), established to help to improve child and mother nutrition in the state. The SNM is a comprehensive approach of the Government with the aim to improve nutrition programming across sectors, it especially works in Integrated Child Development Services (ICDS) and the National Health Mission (NHM). UNICEF plays role as a founding and tech body to support SNM in Uttar Pradesh.

Around third of all the world-wide cases of chronic child malnutrition is found in India. India's 40% children have stunted growth. Though, India has improved in recent years. Percentage of stunted child declined from 48 percent to 39 percent from year 2005-2006 to 2013 - 2015.

Frongillo *et al.* (1997) revealed that Improvement in energy intake, literacy rate of mothers and production is positively associated with reduction in under nutrition. Different region has different health budget. In the context of Asia, high immunization rate and high energy arability are the important factors to combat wasting. Different regions have their own household issues. At different levels factors may be different but at the Severe Acute Malnutrition time a universal approach is needed.

A research survey conducted to assess the nutritional status of one thousand two hundred twenty-three preschool age children was carried out in Tamil Nadu, a developing state of India. Where around 45% of the children were underweight while 51% were in the category of stunted child, 21 percent children were low weight-for-height. In this study 10% children survived with wasting and stunting means both category of malnutrition. Mal nutrition also associated with the age of child. Data shows that stunting condition was increased with the age of child while wasting increased in the first two years of life and then decreased (Steinhoff *et al*., 1986).

Uttar Pradesh is a very large and densely populated state of India. The density of Uttar Pradesh is 829 per sq. km. In current, Uttar Pradesh have 37.08% poverty.

Uttar Pradesh has the highest poverty rate in the world. But a little bit of improvement has been noticed in the past decade. In the time period of 1998 and 2006 percentage of stunted child declined from 61 percent to 52 percent and under weight declined 48 percent to 42 percent while percentage of wasting increased from 17 to 20 percent.

For the management of Severe Acute Malnutrition there is no need of very tight structured treatment and facilities. There is a need of care, love, affection and emotional support by trained health care personnel. Such kind of approach shows gentle recovery to combat this dangerous issue. After recovery from emergency condition child is refer to Nutritional rehabilitation center for residential care facility. In this setup child will be treated with formula diet and medications. This management will be helpful to recover from weight loss, and emotional, physical and mental improvement will be done through counselling from trained team of Nutrition Rehabilitation Center. Basically, Nutrition Rehabilitation Center acts as a pool between ground to hospital and hospital to home. So, we can call Nutrition Rehabilitation Center as a lovely home for Severe Acute Malnutrition child for short stay.

METHOD

For this, we followed a proper channel of review of literature. First of all, we looked for a government data base and after that looked some research data basses as well. We did a systematic review for the study. We reviewed many research paper on Pub Med., Research Scholar, Google, i-scholar and some other websites. The study includes many published research work on

Nutrition Rehabilitation Center, Severe Acute Malnutrition, child and mother health etc. and standard operational procedure and programme guidelines also included.

RESULT

As we already mentioned that for the management of Severe Acute Malnutrition there is no need of very tightly structured treatment and facilities. There is need of care, love, affection and emotional support by trained health care persons.

With such kind of management, the mortality can be reduced and recovery from this condition can be improved. Nutrition Rehabilitation Center is not medicine centric, it's a mix approach of diet and medicine with proper love, care and attention. This is an in-patient facility system where child will stay with their mother or care giver, even play area is also a part of Nutrition Rehabilitation Center for children's motor and emotional development. Nutrition Rehabilitation Center also have a variety of paintings on walls to give lively atmosphere to the children and also to provide a homely feeling.

Thus, Nutrition Rehabilitation Center will be intended to function as a pool between hospital care & home care. Hence, Nutrition Rehabilitation Center will be a home for short time for children with Severe Acute Malnutrition along with the primary care givers.

In Nutrition Rehabilitation Center, Severe Acute Malnutrition screened child will be admit and treated with the full potential of Nutrition Rehabilitation Centerteam. The first step is to identify the Severe Acute Malnutrition child from community with the help of MUAC tape after that the child may be referred to Nutrition Rehabilitation Center on the basis of malnutrition severity. In Nutrition Rehabilitation Center child screening will be done on the basis of Nutrition Rehabilitation Center Guidelines and treated with formula diets according to their need. These guidelines have been adopted from IAP 2006 and WHO's 2009 recommendations.

Nutrition Rehabilitation Centerteam works with some main like residential care with emotional, social and mental support with physical growth, daily feeding and weight monitoring. Nutrition Rehabilitation Center also has an objective to provide counselling to moderate and lite condition of malnourished child.

Nutrition Rehabilitation Center functions through coordination of several staffs at different levels. In a 10 bedded Nutrition Rehabilitation Center the human resource is one doctor, three staff nurses, one nutritionist cum counsellor, one cook and two helpers (Welfare, M. O. 2013). When we talk about therapeutic diet there are two kinds of diet available in the treatment of Severe Acute Malnutrition. First one is F-75 Diet and the second is F-100 Diet. Where F stands for Formula, so these diets are also called as formula diets.

Basically F-75 & F-100 indicate the numerical value of calories of diet. These diets are also available in 2 kinds of variation, one is cereal based and the other one is non-cereal based. These diets are adopted from Indian Academy of Paediatrics (IAP) Guidelines 2006. The compositions of diets are:

Starter Diets (F-75 Diet) – Starter diet is a type of diet which contains 75kcal with 0.9gms of protein. Which is easily digestible for the child and provides the required amount of glucose. There are two kinds of starter diet also, one is cereal based and the another one is non-cereal based.

Starter diet is prepared from cow's milk or toned milk with sugar, vegetable oil, puffed rice (in the case of cereal-based diet) and water.

The composition differs in both medium. Firstly, we discuss about non-cereal starter diet which is composed of 300ml of milk, 100gm of sugar, 20gm of vegetable oil and water to make 1lt of solution.

On the other hand, we use 300ml of milk, 70gm sugar, 20gm oil and 35gms of puffed rice and also water to make it 1lt solution.

These compositions have been adopted from Indian Academy of Paediatrics (IAP) guideline 2006.

Catch-up Diets (F-100) **–**Now we discuss about catch-up diet which is basically used when child is in stabilized phase, usually this phase lasts between two to seven days. This diet is helpful in rebuilding the tissues. This is more energetic diet that provides 100kcal and 2.9gms of protein per 100ml.

These diets are, also known as formula diets, F-75 and F-100 on the basis of their calories count. Both diets are composed of Severe Acute Malnutrition ingredients but differ in the quantity of ingredients.

Non-cereal catch-up diet is composed of 900ml of milk, 75gm of sugar, 20gm of vegetable oil and water to make 1lt of the solution and in cereal based catch-up diet we use 750ml of milk, 25gm of sugar, 20gm oil and 70gms of puffed rice and also water to make it 1lt solution.

These compositions have been adopted from Indian Academy of Paediatrics (IAP) guideline 2006.

Aprameya *et al.* (2015) revealed in their study of 91 cases, that the major factors in Severe Acute Malnutrition are late initiation and inadequate breastfeeding. But Nutrition Rehabilitation Center plays a major role in fight against Severe Acute Malnutrition. Nutrition Rehabilitation Center is an effective approach to combat Severe Acute Malnutrition but there are need of some improvements to make Nutrition Rehabilitation Center more effective and efficient. There is a need of community health centers to reduce high defaulter rate. This step may be helpful to provide better follow-up results.

The study of Ashworth (2006) summarized that community-based rehabilitation are effective but there is need of more concentrated effort. Nutrition aspect is more important. High energy, high protein and micronutrients are required for maintenance of health Severely acute malnourished child. This study also mentions that supplementary food plays a major role. Ready to Use Therapeutic Foods are more convenient and cost effective to maintain child health but unfortunately not much studies are available on this topic. The RTUFs are needed to be provide at health centers and counselling are also needed regarding the Severe Acute Malnutritione.

Taneja *et al.* (2012) study which is based on 48 boys and 52 girls, showed significant improvement in weight gain and MUAC improvement in Nutrition Rehabilitation Center admitted children. The average weight gain during stay length was 9.25 to ± 5.89 g/kg/day. The Severe Acute Malnutrition was decreased. But after discharge from thecenter children lost their weights in 1st follow-up, drop-out rates were also high. Lack of knowledge among mothers was also identified as a major determinant of Severe Acute Malnutrition. Mothers did not know about preparation of therapeutic diets. Yes, Nutrition Rehabilitation Center is effective to recover Severe Acute Malnutrition but results are not sustained due to high defaulters' rate, low follow-ups and lack of awareness among mothers or care takers. This study suggest that some small steps are needed like community-based model and regular consultancy for improvement of follow-ups.

Jonsson (1995) mentioned that low poverty can improve nutritional status. This study highlighted triple A approach of UNICEF which is regarding nutrition. This triple A approach shows, assessment, analysis and action. All programmes based on nutrition need this approach. This study is all about triple A approach.

A study conducted by Caldwel (1993) shows that health changes are based on cultural, social and behavioural factors. Health is needed to reduce mortality and morbidity also. Education is very important factor to improve health status, we need to spread knowledge about malnutrition. With this approach we may be able to secure better ranks in health indicators among other developing counties which are doing well in these indicators. Women play a major role in the nutrition of children. Women's role in fertility control is not avoidable. To improve the nutritional status of the country women should be trained and educated about causes and consequences of Severe Acute Malnutrition and how to avoid it.

Perra and Castello (1995) revealed that there is no doubt Nutrition Rehabilitation Center plays an effective role to recover from Severe Acute Malnutrition. Weight gain also were high in Nutrition Rehabilitation Center in comparison of normal growth. This is also helpful to reduce mortality.

Savadogo (2007) state that Nutrition Rehabilitation Centers have a high dropout rate and several patients died also because of living the Nutrition Rehabilitation Center facility. But has been helpful for the non-emergency child in gaining weight. So, author suggested that Nutrition Rehabilitation Center needs an affiliated emergency extension system to reduce mortality rate. This programme has been found to be helpful for the children suffering from malnutrition in gaining weight and thus talking the Severe Acute Malnutrition, but there is need of extensive care unit with this facility for emergency cases in order to eliminate in-facility and out facility mortality.

Tandon *et al.* (2019) studied 46 Nutrition Rehabilitation Centers of three districts, assessed the mothers' knowledge and children malnutrition status and found that mothers' knowledge was poor and negatively associated with their child health. They concluded that mothers' counselling and training are also needed.

Hashmi and Kumar (2016) revealed That Severe Acute Malnutrition children mostly belong to age group of 1year to 2years. And only 26 percent of severe acute malnourished children gained targeted weight. It is effective but not at their full potential. So, Nutrition Rehabilitation Center should need work on their efficacy.

Lim *et al.* (2012) state that the patient who were malnourished had long stay period in hospitals and not only that even the expenditure on their treatment were also high in comparison to other patients. Mortality was also high in these patients. For better outcome high patient centric strategies are needed in our health system.

Kumar *et al.* (2013) said that nutrition rehabilitation should be linked with community-based programmes. With this approach follow-ups may increase. Nutrition rehabilitation have potential but still there is some space to make improvements, like to reduce follow-ups dropouts, defaulter rates. This study was conducted on 1027 Severe Acute Malnutrition patients.

Ashraf *et al.* (2012) revealed the Severe Acute Malnutrition as other studies follow-ups were not up to date. And for sustainable weight maintenance regular follow-ups are required. Severely acute malnourished children also had some other complications like fever, cough and diarrhoea and Nutrition Rehabilitation Center successfully treated these conditions. From the data, around 2.8% patients died due to Severe Acute Malnutrition, 45% patients completed partial follow-ups, while 68.9% which is around 124 children were successfully completed full procedure of all 4 follow-ups. So, we found that there is still a need of awareness regarding health sustainability after discharge.

Grellety and Golden (2018) state that unidentified patients are more likely to die. As per the government norms, weight for height according Z score is an important factor to determine Severe Acute Malnutrition but when the case is unrecognized the chances of death are more. This study contains 21 data set and found that the mortality was Severe Acute Malnutrition in severely acute malnutrition children identified through MUAC parameter and in Severe Acute Malnutrition child identified through weigh for height parameter which is WHZ<-3Z score only.

Ghimire *et al.* (2020) revealed that when a child belongs to a family where economic and social conditions were limited or provision of food were inadequate, he was four times more prone to be severely malnourished in comparison to normal household child. This study shows that the size of the house, adequacy of food and age of child were correlated to Severe Acute Malnutrition. These indicators associated with Severe Acute Malnutrition and are health predictor as well. The author suggested that kitchen gardening is a good source of nutrition. This engagement will be helpful for poor families to provide better nutrition. All these educational programmes for children and as well as for mothers are also needed. This may be helpful to reduce malnutrition and will be helpful to improve family status.

Ahmed *et al*. (2022), Malnutrition is still a prevalent and existing health problem globally. Under nutrition is not a major problem of developed countries but of developing and under develop countries. Severe Acute Malnutrition is mainly life-threatening condition of developing countries. According to this study malnutrition is multi-level problem and to combat this condition multi-sectoral approach is required. Study also highlighted that poor level of child care and polygamy are additional reason of Severe Acute Malnutrition.

Kumar *et al.* (2020) revealed some major factors responsible for Severe Acute Malnutrition. Author highlighted mothers' age at the time of delivery and low-birth-weight of baby are among the major determinants of a child to be severely malnourished. Inadequate breastfeeding and bottle-feeding practices have also been highlighted as significant factors. Author focused on cause of low birth weight and bottle feeding for their study. Study also mentioned some other factors which were found catalyst for malnutrition like type of house, water source, sanitation, child birth order in the family, type of birth, breastfeeding adequacy, some other infections i.e., fever, cough, diarrhoea etc.

Panda *et al.* (2020) studied on Severe Acute Malnutrition; they included 353 children in their study. They found that around 84 percent severe acute malnourished children were under the age of 2 years. Patients stay length found satisfactory and no death was reported during the stay in Nutrition Rehabilitation Center. Overall, this study found that Nutrition Rehabilitation Center is a good approach to combat malnutrition and it is helpful to recover weight gain. It works on World Health Organization's feeding guidelines which was found satisfactory in this study.

Mena *et al*. (2018) mentioned that this treatment is good for Severe Acute Malnutrition because they found that three-fourth severely acute malnourished children from their study were recovered. They mention that some other factors also altered the response of treatment i.e., inclusion and exclusion criteria of admission, stay length of child in Nutrition Rehabilitation Center, anaemia was also a major associated factor.

Black *et al*. (2003) mentioned in their study, each year more than 10 million children die from preventable causes and almost 90 percent of them belongs to 42 poor countries. However, these causes differ significantly from one country to another. So, there is a need of expansion of child health epidemiology at country level. Another major issue which is common in all countries is the correlation of malnutrition with infectious and non-infectious diseases. So, a better and country specific understanding of child health epidemiology is needed for saving children's lives.

Saaka, M., et al. (2015), This study suggests that, NRC has proved to be very effective in reducing malnutrition among the admitted patients. Average weight gain was 28gm/kg/ day with a mean LOS of 8 days. There was no mortality at all among those patients who completed the course duration of the programme. However, the outcome of NRC is limited by a high defaulter rate, which was 49%. So, the study recommends to find out the reason for such high defaulter rate. For this all the stakeholders including program managers, other staffs and guardian or caretaker of patients should be interviewed. And all the preventable causes should be eliminated through councelling and educating the caretakers.

CONCLUSIONS

On the basis of above studies, we conclude that malnutrition can be considered as a silent killer. Malnutrition is under reported and unrecognized or late identified in small and backward areas' children due to lack of awareness. Malnutrition is a life-threatening issue in developing countries like India. Poverty, education, socio-economic status and many more factors are negatively associated with Severe Acute Malnutrition. Education is a weapon by which people not only be able to fight with circumstances but also people can help themselves in such kind of conditions.

Nutrition Rehabilitation Center is a very good governmental approach but due to lack of awareness and information, population is not able to utilize full benefit of this scheme.

Nutrition Rehabilitation Center have work with major objectives which are documented in guidelines given by World Health Organization. There are some basic parameters on which children are admitted in Nutrition Rehabilitation Centers. These guidelines also contain information about infrastructure, required equipment, human resource, medicines, diets and also financial framework. This will provide directions and guidelines for setting up new Nutrition Rehabilitation Centers and definitely will be effective if implementation is done efficiently. It's a very good approach and provides community-based treatment. For best result we need higher and inclusive standards of inclusion and exclusion criteria. Once admitted children should be treated with the established modus operandi. And continuous monitoring of child should be done. If child don't show any progress, they should refer to higher facility center. When the child is discharge from the facility proper follow-up should be mandatorily done. Education, awareness and knowledge with desire to fight Severe Acute Malnutrition will helpful to reduce malnutrition. Reduction in poverty is a major step against malnutrition.

FUTURE SCOPE

Through this study we discussed various merits and demerits of Nutrition Rehabilitation Centres. Though Nutrition Rehabilitation Cenrters have played and still have been playing a significant role in reducing Severe Acute Malnutrition, there are still gaps in its functioning which is essential to be bridged in order to completely eliminate Severe Acute Malnutrition. We have highlighted these gaps and how to fill them. The inputs can be taken from the study to increase the effectiveness of Nutrition Rehabilitation Centers.

This study also highlighted that how lack of education is negatively associated with malnutrition. Education is important for mothers as well as children. So, we can work on mothers' awareness and knowledge, which will ultimately help her to talking malnutrition.

This study will be helpful in the field of Severe Acute Malnutrition's treatment with the special reference of Nutrition Rehabilitation Center.

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