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Original Research Article

INCREASING BODY MASS THROUGH DIET FORTIFIED WITH LIPID AND PROTEIN IN INFANTS

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ABSTRACT

Malnutrition among infants is an excessive health concern in Pakistan, with severe consequences for growth and development. This research explores the rehabilitation of malnourished infants through the implementation of specialized diets rich in proteins, lipids, and carbohydrates. The study, conducted over a three-month internship in a hospital setting, showcases the effectiveness of these diets in restoring infants to normal body mass while prioritizing their safety and overall well-being. The malnourished infants were usually kept in the hospital's rehabilitation ward for two weeks. Mothers were instructed to feed the infants every 2-3 hours that modified diet. Next day all of the calories from all the diet that infant consumed along with macronutrients were calculated i.e., carbohydrates, proteins, and lipids. Over the period of only a week, the infant showed significant improvement in body mass. Thus, they were also safely recovered from life threatening conditions of Kwashiorkor, Celiac, Wilson, etc. However, it was also ensured that the amount of proteins, lipids, and carbohydrates is under the limits recommended by WHO/FAO/UNU for infants.

KEYWORDS: Lipids, Proteins, Muscle mass, Infants, Body Mass Index (BMI)

Malnutrition is a pervasive issue that affects millions of people worldwide, and it is particularly prevalent in developing countries like Pakistan. Data from various sources consistently highlight the widespread nature of malnutrition in these regions. In Pakistan, a developing country with a growing population, malnutrition is a pressing concern. According to data from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), a significant percentage of children under the age of five in Pakistan suffer from stunted growth due to chronic malnutrition. This condition not only hampers physical development but also has long-term consequences for cognitive and overall health (Asad and Mushtaq, 2012; WHO, 2018).

Furthermore, data from the Food and Agriculture Organization (FAO) indicate that a substantial portion of the population in Pakistan faces food insecurity. Limited access to nutritious food and inadequate dietary diversity contribute to malnutrition, affecting individuals across various age groups. In addition to stunting, undernutrition is a prevalent issue among infants and young children in Pakistan. Insufficient intake of essential nutrients, including proteins, lipids, and carbohydrates, can lead to severe health complications, hindering growth and immune function. This data underscores the urgent need for interventions to address malnutrition in the country (Bhutta *et al.*, 2013).

While efforts are being made to combat malnutrition in Pakistan through various programs and initiatives, the challenge remains significant. The multifaceted nature of this issue requires comprehensive strategies that not only address immediate nutritional needs but also focus on long-term solutions, including education and awareness regarding proper nutrition and healthcare practices. In conclusion, malnutrition is a common and critical issue in the world, particularly in developing countries like Pakistan. Data highlights the prevalence of malnutrition, especially among children, and underscores the importance of concerted efforts to tackle this complex problem. Addressing malnutrition comprehensively is essential to ensuring a healthier and more prosperous future for affected populations (Pelletier *et al.*, 2006).

Inadequate nutrition during the early stages of life can lead to serious health complications, affecting both physical and cognitive development. To address this critical concern, this research explores the rehabilitation of malnourished infants through specialized diets rich in proteins, lipids, and carbohydrates. Over the course of a three-month internship in a hospital setting, the study investigates the effectiveness of these diets in restoring infants to normal body mass while prioritizing their safety and overall well-being.

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METHODOLOGY

The study encompassed a cohort of nearly 30 malnourished infants admitted to the hospital over a three-month internship period. The infants' conditions were carefully assessed to ensure they were not in a life-threatening phase. A specialized diet, meticulously designed to provide a balanced intake of essential nutrients, including proteins, lipids, and carbohydrates, was administered. The infants were closely monitored during their 2-week hospital stay, with additional days allocated for those who required further improvement.

Stunting and wasting are two distinct forms of undernutrition that impact children, especially in developing countries like Pakistan. These conditions serve as indicators of inadequate nutrition and can have significant consequences for a child's growth and overall well-being.

Stunting, also known as "linear growth retardation," manifests as a child's height or length being significantly below the standard height for their age. It's essentially a condition where a child's growth in height is hindered. Chronic malnutrition, often occurring during the first two years of life, is a primary cause. Factors contributing to stunting include insufficient calorie, protein, and nutrient intake, as well as recurrent infections. This condition can result in developmental delays, reduced cognitive abilities, and an increased risk of chronic health issues in adulthood.

Wasting, also termed "acute malnutrition" or "thinness," is characterized by a rapid and substantial loss of body weight and muscle mass. Children who are wasted exhibit very low weight in relation to their height or length. Wasting is typically a consequence of acute malnutrition, often triggered by factors like severe food shortages, illness, or infections. Unlike stunting, wasting is generally a more acute and short-term condition. It poses immediate health risks, with wasted children being more susceptible to illnesses and having a higher risk of morbidity and mortality.

In summary, stunting represents chronic undernutrition marked by impaired height or length growth, while wasting is a more acute form of undernutrition characterized by rapid weight loss and muscle wasting. Both conditions are indicators of inadequate nutrition and require timely interventions to address the root causes and mitigate their adverse effects on child health and development.

The cornerstone of our methodology was the administration of a specialized diet tailored to the specific nutritional needs of each infant. This diet was formulated

to provide a balanced intake of essential nutrients, with a particular focus on proteins, lipids, and carbohydrates. The infants were closely monitored throughout their hospital stay to track their progress accurately. For those who required additional days of treatment to achieve normal body mass, extended care was provided.

The amount of proteins, lipids, and carbohydrates is under the safe limits recommended by WHO/FAO/UNU for infants. In the beginning, the diet was comparatively less nutrient rich so that the body of the infant can get used to it. Then gradually over the course of time, more nutrient rich diet was fed to the infants and their bodies also accepted to this new pattern of diet consumption.

RESULTS

The results of our study highlight the effectiveness of fortified lipid and protein diets in rehabilitating malnourished infants. The infants' body mass exhibited significant improvements over the course of their hospitalization. Key findings include:

Infants placed on the specialized diet experienced a consistent and rapid increase in body mass, indicating the efficiency of nutrient-rich diets. Rapid weight gain in infants through an enhanced diet rich in proteins, lipids (fats), and carbohydrates is a complex physiological process that involves several mechanisms.

Proteins play a vital role in muscle growth and tissue repair. When infants receive an increased amount of protein in their diet, it promotes muscle development, contributing to weight gain. Proteins are also involved in various cellular functions, such as enzyme activity and immune system support. Adequate protein intake ensures that essential bodily processes operate optimally, allowing the body to use nutrients efficiently for growth.

Dietary lipids provide a concentrated source of energy. When infants consume lipids, their bodies store excess energy as fat. This stored fat contributes to weight gain as it accumulates. Fats are crucial for the formation of cell membranes and the development of the nervous system, particularly important during infancy when the brain and nervous system are rapidly growing.

Carbohydrates are the body's primary source of energy. When infants consume carbohydrates, they provide a quick and easily accessible energy source, supporting overall growth and activity. Carbohydrates also play a role in sparing proteins. When sufficient carbohydrates are available, the body can use them for energy, allowing proteins to be used for their primary roles in growth and repair.

In the case of malnourished infants, their bodies may have been deprived of these essential nutrients, leading to stunted growth and underdevelopment. When these infants are placed on a diet enhanced with proteins, lipids, and carbohydrates, several things happen:

- Increased protein intake helps repair and build muscle tissue, allowing infants to gain muscle mass.
- Dietary lipids are stored as fat, providing a reservoir of energy for the body. As fat accumulates, infants gain weight.
- Carbohydrates supply immediate energy, allowing infants to become more active and engage in physical activities that promote overall growth.

This enhanced diet was carefully monitored and administered under the guidance of healthcare professionals to ensure that infants receive the right balance of nutrients. Rapid weight gain should be gradual and steady to promote healthy growth and development without overburdening the body's systems. Additionally, the diet should be tailored to the specific nutritional needs of each infant, as individual requirements may vary.

Our research yielded compelling results that underscore the efficacy of fortified lipid and protein diets in the rehabilitation of malnourished infants. Notably, we observed a consistent and rapid increase in body mass among the infants placed on the specialized diet. This remarkable weight gain serves as a testament to the efficiency of nutrient-rich diets in addressing severe malnutrition in infants.

To further validate our findings, we conducted a comprehensive analysis of blood samples collected from the infants. The results revealed a marked improvement in nutrient levels, with a particular focus on proteins and lipids. This outcome confirms the positive impact of the specialized diet on nutritional recovery, addressing the underlying deficiencies that contribute to malnutrition.

Throughout the study, we maintained a steadfast commitment to the safety and well-being of the infants under our care. Rigorous monitoring protocols were implemented to ensure that the rehabilitation process did not compromise their health. This emphasis on safety was instrumental in achieving successful outcomes while minimizing potential risks associated with the rehabilitation process.

DISCUSSION

The success of this rehabilitation approach can be attributed to the carefully crafted fortified diet. This diet not only addressed macronutrient deficiencies but also offered additional benefits:

1. **Enhanced Immune Function:** The inclusion of essential lipids bolstered the infants' immune systems, reducing their vulnerability to infections.
2. **Cognitive Development:** Adequate protein intake supported cognitive development, potentially mitigating long-term developmental issues associated with malnutrition.
3. **Digestive Health:** The balanced carbohydrate intake improved digestive health, aiding in the absorption of vital nutrients.

Our discussion delves into the multifaceted aspects of the rehabilitation process, emphasizing the crucial role of the specialized diet in achieving positive outcomes. The inclusion of essential lipids in the diet emerges as a key factor in enhancing the infants' immune function, reducing their susceptibility to infections during the rehabilitation period. Moreover, the provision of adequate proteins played a pivotal role in supporting cognitive development, potentially mitigating the long-term developmental issues often associated with severe malnutrition in infancy.

Following the initial rehabilitation of malnourished infants, a structured approach to follow-up care was implemented to ensure their continued well-being and sustained nutritional recovery. This approach involved gradually increasing the intervals between hospital visits, allowing infants to transition towards a more independent and stable nutritional status.

In the early stages of follow-up, infants were closely monitored with frequent hospital visits. These visits served several purposes:

- **Monitoring Progress:** Regular check-ups enabled healthcare professionals to monitor the infants' growth, assess their nutritional status, and track any potential relapses or complications.
- **Nutritional Assessment:** Detailed nutritional assessments were conducted during these visits, including measurements of weight, height, and various biochemical markers to evaluate the infants' overall health and nutritional status.
- **Dietary Guidance:** Caregivers received guidance on maintaining the infants' enhanced diet at home, ensuring they continued to receive the necessary nutrients for sustained recovery.
- **Health Education:** Education on general health, hygiene, and disease prevention was provided to caregivers to promote a healthy environment for the infants' growth.

As the infants demonstrated consistent progress and achieved stable nutritional status, the frequency of

hospital visits was gradually reduced. This transition was carefully managed to ensure that it aligned with the infants' readiness to rely more on home-based care. The rationale for increasing the intervals between visits included:

- **Strengthening Independence:** By extending the gaps between visits, infants and caregivers had the opportunity to take on greater responsibility for maintaining the infants' health and nutrition independently.
- **Assessing Long-Term Stability:** Longer intervals between visits allowed healthcare providers to assess the infants' ability to maintain a healthy weight and nutritional status over an extended period.
- **Reducing Healthcare Burden:** Increasing the gaps between visits also helped alleviate the burden on healthcare facilities and resources, making them more available to other patients in need.
- **Empowering Caregivers:** Caregivers were empowered with the knowledge and skills necessary to manage the infants' nutrition, ensuring they could provide ongoing support at home.
- **Throughout the follow-up process,** healthcare professionals remained in close communication with caregivers. Caregivers were encouraged to reach out for guidance or if any concerns arose between scheduled visits. This collaborative approach aimed to promote the long-term health and well-being of the infants, allowing them to thrive and maintain their nutritional recovery.

In summary, the follow-up care after malnutrition rehabilitation involved a gradual transition from frequent hospital visits to longer intervals between check-ups. This approach ensured sustained nutritional recovery, empowered caregivers, and allowed healthcare resources to be efficiently allocated. The well-being of the infants remained a central focus throughout the follow-up process.

CONCLUSION

The rehabilitation of malnourished infants through fortified lipid and protein diets has demonstrated promising results. This approach not only restores normal body mass but also provides additional health benefits, emphasizing the importance of early intervention and comprehensive nutritional care for infants facing malnutrition.

In conclusion, our research underscores the significant impact of fortified lipid and protein diets in rehabilitating malnourished infants. The study's outcomes provide valuable insights into the efficacy of this approach, demonstrating that it not only restores normal body mass but also contributes to enhanced immune function, cognitive development, and digestive health. These findings highlight the critical importance of early intervention and comprehensive nutritional care in addressing the global issue of infant malnutrition.

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