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Assessment of malnutrition in hospitalized children in a tertiary care hospital in Pakistan

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Abstract

Malnutrition in children is common in developing countries and hospitalized children suffer from more severe malnutrition which result in increased length of hospital stay and delay in recovery from disease. The children admitted to hospital wards were included in study. The age, weight and height of children and their nutritional status was noted initially. The patients were divided in different age groups. The calories requirement of hospital children was calculated and then their daily intake of calories through food is calculated. And by subtracting calories intake from required calories. Deficit of calories was calculated.

The results shows that children from burn ward suffer more severe malnutrition than children from sepsis and major surgery ward. In male patients of age group 1-5 years in sepsis and major surgery ward, the mean deficit of calories was 909 calories and in patients of burn ward mean deficit of calories was 1062 calories. In female Patients of age group 1-5 year in sepsis and surgery ward, the mean deficit of calories was 814 calories and in patients of burn ward deficit of calories ward is 1035 calories.

In Male Patients of age group 6-9 years in sepsis and surgery ward, the mean deficit of Calories was 1112 calories and in patients of burn ward the deficit was 1266 calories. In female patients of age group 6-9 years in sepsis and surgery ward, the mean deficit of Calories was 996 calories and in patients of burn ward the deficit was 1564 calories.

In Male Patients of age group 10-12 years in sepsis and surgery ward, the mean deficit of Calories was 1431 calories and in patients of burn ward the deficit was 1687 calories. In female patients of age group 6-9 years in sepsis and surgery ward, the mean deficit of Calories was 1354 calories and in patients of burn ward the deficit was 1540 calories. It was concluded from the study that that malnutrition during hospitalization is a major problem in developing countries.

Keywords: malnutrition, hospitalized children, calories deficit, calories required

Introduction

Worldwide, malnutrition among children under 5 years of age is considered as the most prevalent public health problem in South Asian countries ^[1].

It is reported that more than 50% children in South Asia are malnourished, and half of the world's malnourished children reside in Pakistan, India, and Bangladesh ^[2].

As the effects of malnutrition are highly visible on the physical, mental, social, and intellectual development of young children, the, importance of effective nutrition cannot be denied during early years ^[3].

The nutritional status of children often deteriorates after admission to the hospital. Although the exact prevalence of malnutrition in hospitalized children is extremely difficult, studies suggest that more than 50% of children in acute medical or surgical wards are nutritionally compromised ^[4, 5]. In children, malnutrition can have early and serious consequences, such as slowing of growth and increased susceptibility to various infections. Hospital acquired malnutrition is also associated with increased risk of adverse clinical events and longer hospital stays, which incur additional health care costs ^[6].

The synergistic relation between malnutrition and infection is well known, and nutritional interventions have been recognized as an important approach for reducing mortality from acute respiratory illness and diarrhea ^[7]. The World Health Organization (WHO) Integrated Management of Childhood Illness initiative is based on the premise that combining efforts to promote the appropriate case management of serious infectious diseases with nutritional interventions, immunization programs, and other disease prevention and health promotion activities will be more effective in decreasing child mortality than implementing any one of the components alone ^[8, 9].

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Malnutrition is common in hospitalized patients in the United States (U.S.), and it is associated with unfavorable outcomes including higher infection rates, poor wound healing, longer lengths of stay, and higher frequency of readmission.

Most protein-energy malnutrition in the United States is secondary malnutrition; that is, a complication of another disease process. Anorexia, iatrogenic inanition, mal-absorption, infection, or drugs may result in the deterioration of nutritional status with increased risk of infection, surgical morbidity and death [11].

To prevent acute hospital-acquired malnutrition and its complications, the risk of nutritional depletion needs to be identified at the time of admission so that appropriate nutritional intervention can be initiated at an early stage [12].

Although nutritional risk assessment tools and screening methods have been developed, they are complicated and unsuitable for routine use on a hospital-wide basis. Moreover, none of them were specifically designed for use in a pediatric setting [13]. Objective of the study was to draw the attention of health care authorities about importance of nutrition requirement among hospitalized children. There should be the role of nutritionist to counsel the patients about the importance of diet. Because malnutrition can cause length of stay of hospital and increase in duration and severity of disease. So care should be taken particularly among burn ward and sepsis ward patients.

Patients and Methods

Study design

A Prospective interventional study was conducted after taking consent from the patients at Mayo hospital Lahore, patients admitted to surgical and medical ward were included in the study.

Patient was divided into age groups from 1-5, 6-9 and 10-12. Patients were categorized into different age group on the basis of care and importance of nutrition at different age level. 1-5 year age children are solely under mother care and 6-9 year children are partially under mother care or play group children and 10-12 year age children are school going children. Hence calories requirement were different according to weight as well as age. They were further divided into two groups according to their disease condition. One those with major surgery and sepsis with conversion factor of 1.2 and other group was those with burns conversion factor of 1.5.

Patients were included in the study after taking consent from the care giver. Patient parameters like height, weight, age and gender was noted. And required total energy was calculated for each child according to their weight by following rule.

Weight calories

0-10 kg 100-115 kcal/kg

11-20 kg 1000 kcal + 50cal/kg/for each kg > 10kg

>-20 kg 1500 kcal/kg for each kg > 20 kg

Patients were interviewed regarding their nutritional status; their daily intake of energy was calculated after interviewing them regarding their intake of diet.

Than there required amount of energy under stress condition was calculated by the formula

Requirement under stress=Maintenance x conversion factor

(Cal/Kg/day) Requirements From given
As determined (cal/kg/day)

Conversion factor for patient of sepsis = 1.2

Conversion factor for Patient of Major surgery = 1.2

Conversion factor for patients of burn (less than 50%) = 1.5

Then their nutrition status was assessed by subtracting the intake of calories from the required total calories and calculating the deficit of energy

$$\text{Total Deficit} = \text{Required Calories} - \text{intake of calories.}$$

The following chart was used to calculate the energy gained by food portion. Intake of calories was assessed by using this chart and required calories was calculated for individual patients.

Calorie counter

S#	Food Item	Measurements	calories
1	Whole flour	100 gm = 1 cup 1 chapati = 25 gm	350-400 100
2	Bread	1 slice = 28 gms	65
3	Paratha	1	200
4	Rice Boiled	100 gms = ¾ cup	190
5	Khichri	1 oz	40
6	Sagodana	1 oz	20
7	Dal (lentils)	cooked=100gm=½ cup cooked	180
8	Vegetables	Average serving=100gms	25-30
9	Potato	1 medium=100 gms	75-80
10	Apple	1 medium=100 gms	80
11	Banana	1 medium=100 gms	100
12	Grapes	20 small/10 large grapes=100gm	80
13	Guava	1 medium=100 gms	80
14	Mango	100 gms	65
15	Melon	100 gms	25
16	Orange	1 medium=100 gms	40
17	Peach	100 gms	50
18	Papaya	1 oz	40
19	Powder milk	1 oz	20
20	Human milk	1 oz	23.3
21	Buffalo milk	1 oz	30
22	Cow milk	1 oz	20
23	Yogurt	1 oz	20
24	Meat	1 piece	50
25	Chicken	100 gms	180
26	Fried fish	100 gms + oil 1 ½ tsp	161
27	Oil	1 tsp = 5 gms = 5 ml	45
28	Egg	1 egg = 50-60 gms	80
29	Sugar	1 tsp = 5 gms	20

Sample size

Patients who met the inclusion criteria were included in the study. 200 patients were included in the study after taking informed consent. 88 patients were from burn ward 112 patients were from sepsis and major surgery ward. Out of 88 burn ward patients 34 were females and 54 were males. Out of 112 patients from sepsis and major surgery wards 42 were females and 70 were males.

Inclusion criteria

1. Patients of age 1 year to 12 year were included in the study
2. Patient admitted to burn ward , major surgery and sepsis ward were included in the study
3. Patients whose stay in the hospital was more than 48 hours were included in the study
4. Patients who were able to eat orally feeding were included in the study

Exclusion criteria

1. Patients whose age was less than 1 year or more than 12 year were excluded from the study
2. Patients with life threatening infections were excluded from the study

3. Patients feeling difficulty in oral feeding were excluded from the study

Results

Table1: Age group 1-5 years

Descriptive Statistics							
Calories	Gender	Patient Category	N	Minimum	Maximum	Mean	Std. Deviation
Calories required	Female	Sepsis	14	660.00	2025.00	1289.2857	303.85255
Calories deficit	Female	Sepsis	14	510.00	1396.00	814.4286	244.61735
Calories required1	Female	Burn	26	900.00	2100.00	1484.2308	314.12638
Calories deficit1	Female	Burn	26	410.00	1673.00	1035.2308	372.65322
Calories required3	Male	Burn	30	1200.00	3210.00	1612.8000	351.27408
Calories deficit3	Male	Burn	30	435.00	1500.00	1062.4667	289.52872
Calories required4	Male	Sepsis	25	200.00	2040.00	1259.7600	326.81510
Calories deficit4	Male	sepsis	25	425.00	1940.00	909.2400	322.47743

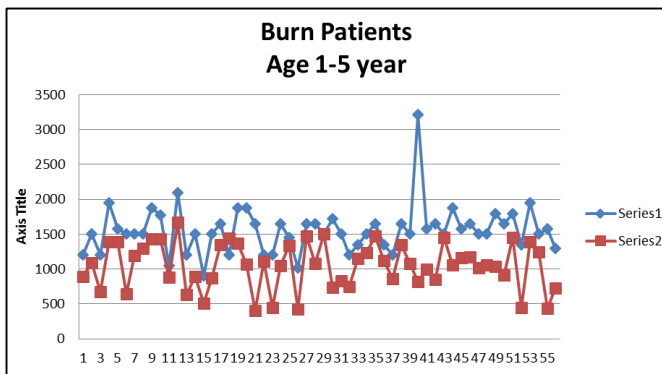


Fig 1: Burn Patients age 1-5 years

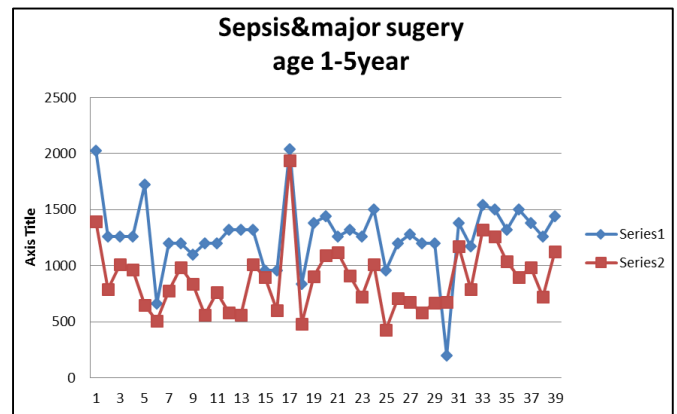


Fig 2: Sepsis and Major surgery age group 1-5 years

Series 1 = calories required series 2 = Deficit of calories

Series 1 = calories required series 2 = Deficit of calories

Table 2: Age group 6-9 years

Descriptive Statistics							
Calories	Gender	Patient category	N	Minimum	Maximum	Mean	Std. Deviation
Calories required	Male	Burn	12	1500.00	2960.00	2127.9167	395.58621
Calories deficit	Male	Burn	12	280.00	2025.00	1266.9167	547.79284
Calories required1	Male	Sepsis	19	1380.00	2100.00	1716.6316	210.65512
Calories deficit1	male	Sepsis	19	125.00	1824.00	1112.6842	383.42463
Calories reuiredt2	Female	Burn	6	1725.00	2400.00	2158.3333	255.27763
Calories Deficit2	Female	Burn	6	1210.00	2100.00	1564.1667	346.27181
Calories Required3	Female	Sepsis	20	1200.00	2160.00	1519.2000	286.79749
Calories Deficit3	Female	sepsis	20	436.00	1980.00	996.4500	350.02458

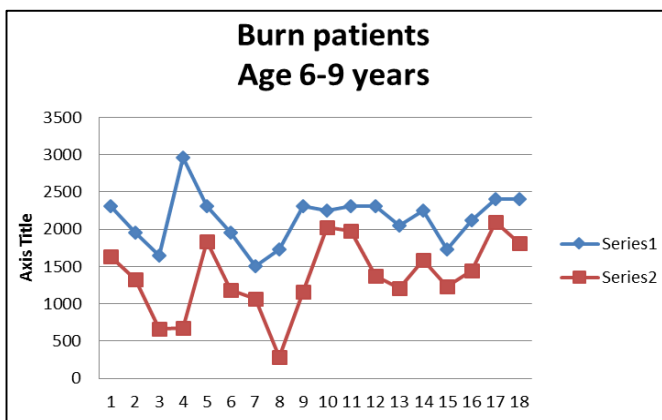


Fig 3: Burn Patients age6-9 years

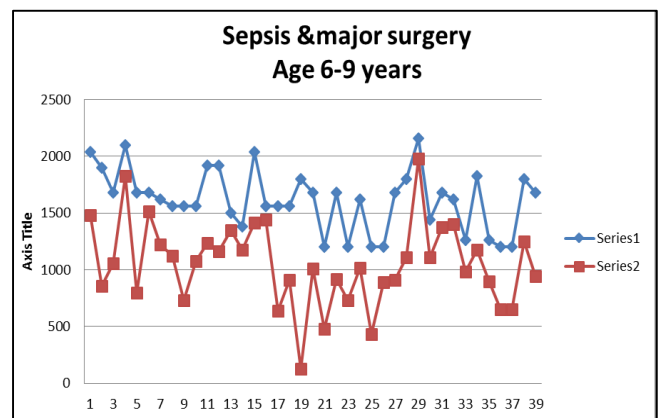


Fig 4: Sepsis and major surgery patients' age 6-9 years

Series 1 = calories required series 2 = Deficit of calories

Table 3: Age group 10-12 years

Descriptive Statistics							
	Sex	Patients category	N	Minimum	Maximum	Mean	Std. Deviation
Calories Required	Male	Burn	12	2280.00	3160.00	2459.0000	248.91985
Calories Deficit	Male	Burn	12	1090.00	2470.00	1687.0833	423.89138
Calories required1	Male	Sepsis & surgery	26	1700.00	2376.00	2006.6154	174.28874
Calories deficit1	Male	Sepsis& surgery	26	872.00	2088.00	1431.5000	365.36987
Calories required2	Female	Burn	2	2025.00	2340.00	2182.5000	222.73864
Calories deficit2	Female	Burn	2	1535.00	1545.00	1540.0000	7.07107
Caloriesrequired3	Female	Sepsis& surgery	8	1620.00	2040.00	1884.7500	131.00027
Calories deficit3	Female	Sepsis& surgery	8	835.00	1560.00	1354.2500	248.56833

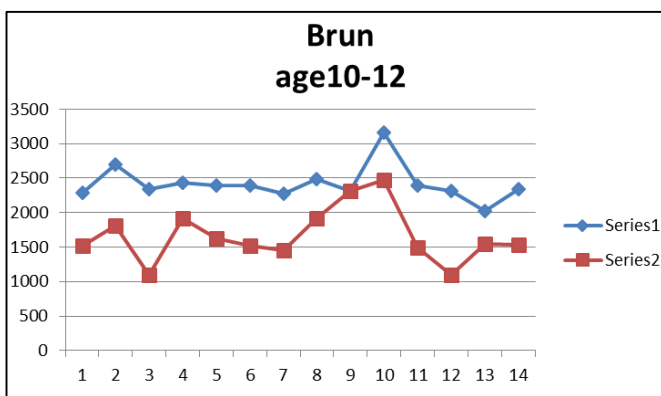


Fig 5: Burn patients age 10-12 years

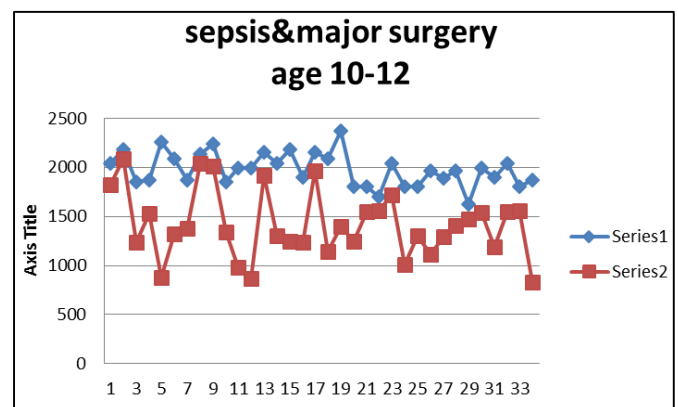


Fig 6: Sepsis and major surgery patients age group 10-12 years

Series 1 = calories required series 2 = Deficit of calories

Series 1 = calories required series 2 = Deficit of calories

Table 4: Average stay in hospital

Age group (years)	Gender	Patient category	Average stay in the hospital (days)
1-5	Male	Burn	5
		Sepsis and major surgery	4
1-5	Female	Burn	6
		Sepsis and major surgery	4
6-9	Male	Burn	5
		Sepsis and major surgery	3
6-9	Female	Burn	5
		Sepsis and major surgery	4
10-12	Male	Burn	6
		Sepsis and major surgery	2
10-12	female	Burn	5
		Sepsis and major surgery	4

The results shows that the malnutrition result in increased length of stay in hospital and this could lead to economic burden on hospital as well as on patients and could result in severity of disease among patients.

Discussion

The prospective study was conducted to assess the malnutrition in hospitalized children in burn ward and sepsis and major surgery ward. The results indicate that the burn ward patients suffer from more severe malnutrition as compared to sepsis and major surgery ward. Hill GL *et al*, studied the malnutrition in surgical patients they concluded

that surgical patients suffer from anemia, vitamin deficiency and weight loss and these abnormalities had gone unrecognized even in patients with sepsis after major surgery [14]. Dylewski ML *et al*, studied the incidence of injury related to malnutrition in pediatric burn patients they concluded that 61% patients were diagnosed with severe malnutrition [15]. In this study deficit of calories in female patients of age group 6-9 year among sepsis and major surgery patients was 996 calories and among burn patients was 1564 calories which shows severe malnutrition among burn patients. Kingu HJ *et al* studies the malnutrition and survival function among burn patients in Africa. They showed that 62% patients suffer from

acute malnutrition and cause 7 days Prolong hospital stay ^[16]. female suffer from malnutrition a bit more as compared to males. There is need of proper system to calculate the energy requirement for burn and sepsis ward patients and nutritionist should play their role in educating and counseling the patients and their care givers.

There is a great need to take care of the patients regarding their diet. So that proper diet can help them for early recovery from the disease and reducing the length of stay in the hospital as well as reducing the cost.

The nutritionist can play an important role in educating patients and guiding them regarding their diet requirement during their hospital stay. In developing countries like Pakistan it is not in common practice to calculate the calories requirement of hospital admitted children. There is great need to calculate the requirement of calories of at the time of admission and regularly during the stay of children in hospital and then educating the care taker of patient regarding importance of taking care regarding diet of children and how it is important in their early recovery from the disease.

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