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NUTRITIONAL REQUIREMENTS OF PATIENTS IN CARDIAC SURGICAL INTENSIVE CARE UNIT AND REASONS FOR UNDERFEEDING

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ABSTRACT

Objective: To measure the nutritional intake of patients in cardiac surgical intensive care unit and identify the nutritional factors contributing to underfeeding.

Study Design: Descriptive Cross Sectional study

Place and Duration of Study: Research was carried out in Adult Cardiac Surgical Intensive Care Unit of Armed Forces Institute of Cardiology & National Institute of Heart Diseases, Rawalpindi from August 2015 to January 2016.

Material and Methods: All the patients who had undergone cardiac surgery were included. Data was collected on 5 post op day. Patients less than 18 years of age were excluded. Energy requirements were determined using PSU 2003b (Penn State equation). Food intake was recorded and calories were calculated through exchange list. Reasons of underfeeding were observed including dietary non compliance, diarrhea, nausea/ vomiting, constipation, swallowing difficulty, abdominal cramps, chewing difficulty, abdominal distention, aspiration, absence of bowl sounds, delay in enteral/parenteral feeding, inappropriate caloric and protein density of parenteral feeds.

Results: Average caloric requirement of the patients was 1796 kcal whereas average caloric intake of the patients was 1237 kcal. Mean protein requirements of the targeted patients were 92 gm and average protein intake was 49.5 grams. Dietary non compliance was present in 35 (57%) patients, 15 (25%) were having nausea/ vomiting.

Conclusion: Most of the patients in our research were consuming less than 80% of the required calories and proteins. Main reason of underfeeding was dietary noncompliance followed by nausea / vomiting and inappropriate caloric density of parenteral formulas.

Keywords: Cardiac surgical, Intensive care unit, Nutritional requirements.

INTRODUCTION

Malnutrition in critically ill patients is associated with an increased risk of morbidity and prolonged hospitalization[1] The goal of nutrition therapy (NT) in critically ill patients include provision of adequate nutritional support, prevention of nutritional deficiencies, mitigating loss of lean body mass, decreasing complications and improving clinical outcomes[2]. Most ICU patients doesnot have adequate oral intake for various reasons, such as mechanical ventilation, sedation, or a decreased level of consciousness. In such cases, nutritional support, the delivery of formulated nutrients (prepared nutrient solutions) can meet a patient's nutritional needs. Previous studies have demonstrated that many enterally/parenterally-fed ICU patients often receive a much lower caloric intake than their daily requirement for various reasons. When nutritional support does not meet a patient's daily caloric requirement, underfeeding occurs. Adverse consequences may be experienced by critically ill patients who are underfed during their stay in the intensive care unit.

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MATERIAL AND METHODS

This cross-sectional study was carried out at adult cardiac surgical Intensive care unit of Armed Forces Institute of Cardiology in Rawalpindi Pakistan from August 2015 – January 2016. Patients who had undergone cardiac surgery were included. Data was collected on 5 post operative day. Patients less than 18 years of age were excluded. Patients were selected through non probability

convenient sampling. Demographic data was collected for all patients including: age, weight, height, BMI and gender. Comorbities were also recorded including diabetes, hypertension and renal impairement. Laboratory findings were observed including Total Lymphocyte Count, blood glucose level, creatinie and albumin. Energy requirements were determined using PSU 2003b(penn state equation) for critically ill patients.[3]

PSU 2003b =Mifflin (0.96)+ VE (31)+ Tmax (167)-6212[4,5].

Mifflin equation is used to estimate calories for normal patients it is calculated as

Men : RMR =(9.99x weight)+(6.25X height)-(4.92Xage)+5

Women : RMR =(9.99X weight)+(6.25X height)-(4.92X age)-161

Where as VE is minute ventilation and is calculed by

VE= Tidal Volume × Respiratory Rate

Tmax is maximum body temperature recorded in a 24-hr period.

Patients with BMI more than 30, were advised 60-70% of targeted energy requirements.

Protein requirements were determined through following formula:

Protein >2.0 g/kg IBW/day for BMI 30-40.

BMI <30: 1.2 to 1.5 g/kg/day[(6-9)].

Patients 24 hour intake was recorded on history sheets and calories were calculated through exchange list, it is a diet-planning tools that organize foods by their proportions of carbohydrate, fat, and protein. Foods on any single list can be used interchangeably[10]. Reasons of underfeeding were observed including dietary non compliance, diarrhea, nausea/ vomiting, constipation, swallowing difficulty, abdominal cramps, chewing difficulty, abdominal distention, aspiration, absence of bowl sounds, delay in enteral/parenteral feeding, inappropriate caloric and protein density of parenteral feeds[11,12].

RESULTS

According to our research 45 patients (75%) out of 60 patients were male and 15 patients were female (25%). Mean age of the patients was 54 ± 11.4 (ranges: 26-78). Mean height was 163.9 ± 9.2 (ranges 137-188cm) and mean weight 69.9 ± 13.4. 67% (ranges 35-105kg).

Table : Reasons of Underfeeding.

Rasons of underfeeding	Present
Dietary non compliance	35 (57%)
Diarrhea	4 (6.6%)
Nausea /vomiting	15 (25%)
Constipation	6 (9.8%)
Swallowing difficulty	3 (5%)
Abdominal cramps	1(1.7%)
Chewing difficulty	4 (6.7)
Abdominal distention	4 (6.7)
Aspiration,	8 (13%)
Delay in enteral/parenteral feeding,	4 (6.7)
Inappropriate caloric and protein density of parenteral formulas	10 (16.7%)

66% (n=40) of patients were post CABG, 15% (n=9) were post MVR and 6% (n=4) were post DVR.

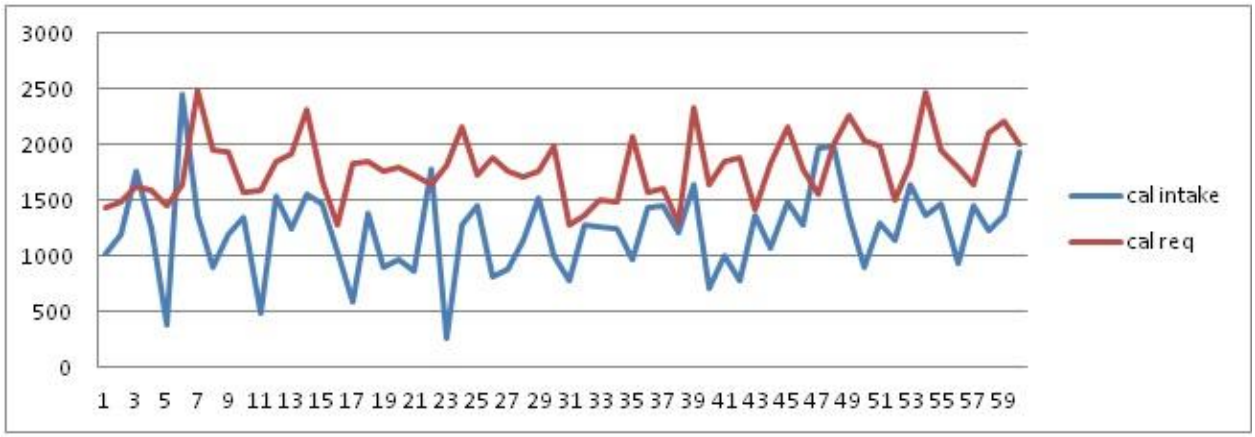
16 (28%) patients had renal impairment, 22 (36%) were diabetic and 27 (45%) patients were hypertensive. 32% (19) of the patients were on ventilatory support.

Combination of parenteral and enteral nutrition was consumed by 9 (15%) patients, 1 (1.7%) patient consumed combination of enteral and oral Intake, 6(10%) patients were on parenteral and oral intake combination, 35 (58%) patients consumed nutrients orally, 5(8.3%) parenterally and 4 (6.7%) enterally.

Average caloric requirement of the patients was 1796 ± 284, minimum 1287 kcal and maximum 2488 kcal whereas average caloric intake of the patients was 1237 ± 397, minimum 265 kcal and maximum 2450 kcal. Mean protein requirements of the patients were 92 gm ± 20.2, 53 g minimum and 135 g maximum. Protein intake of the patients was 49.5 ± 19, minimum 7 grams and maximum 92 grams .

Underfeeding is denoted as the delivery of < 80 % of estimated energy requirement (EER), adequate feeding was 80-110 % of EER, whilst overfeeding was > 110 % of energy[13]. Twenty Eight patients out of 60 patients were consuming calories more than 80% of the requirements, as shown in Graph-1

Dietary non compliance was present in 35 (57%) patients. Patients were consuming small quantities of meal and there were long intervals in between meals. In our study patients with complications of nausea and vomitting were 15 (25%) . Interruption of NG feeding due to food particles aspiration and absence of bowl sound was present in 8 (13%) patients. Out of 60 patients 27% of the patients were advised parenteral nutrition, among those patients target calories were achieved by the 10 patients. Inadequate supply was due to inappropriate caloric and protein density of parenteral formula. Summary of the factors contributing to underfeeding are mentioned in table-1



Graph-1: Relationship between caloric intake and caloric requirement.

DISCUSSION

From the first studies published about the hospital undernutrition[14,15,16] to the more recent ones,[17,18] undernutrition prevalence rates have maintained a considerably high rate. There are multiple causes for that malnutrition, as the illness process itself, the hospitalization, the diagnostic and therapeutical procedures, which very often include fasting and the lack of interest about a patient's nutritional status.

In a survey which was carried out at Adult cardiac Surgical intensive care unit of Armed forces institute of cardiology and National Institute of Heart Diseases in 2014 showed that the average caloric intake of the patients on the third post op day was 820 kcal ranged from 120-1325 kcal. (58% less than the optimum intake)[19]. Whereeas in our study which was performed in the same adult cardiac surgical intensive care unit of Armed forces institute of cardiology and National Institute of Heart Diseases in 2015 showed an increase in caloric intake of the patients i.e. 1237 kcal, minimum 265 kcal and maximum 2450 kcal.

Observational studies have shown that protein intake according to current guidelines, 1.2 to 1.5 g/kg/day, was related to lower mortality.[6-9] In our study average protein intake of the patients was 49.5.

Out of 42 patients which were consuming calories orally, dietary non compliance was present in 35 (57%) patients. According to World Health Organization (WHO) compliance is the extent to which the behavior corresponds with agreed recommendations from a health care provider[20]. Dietary non compliance was due to psychosis, dizziness, fever, anorexia, respiratory support (tracheotomy/bipap/cpap),

irritability because of medications, chest drains and hospitalization. In our study 15 (25%) patients were having nausea/ vomiting. According to Apfel and Sinclair incidence of vomiting is about 30%, the incidence of nausea is about 50%, and in a subset of high-risk patients, the PONV(Postoperative nausea and vomiting) rate can be as high as 80%[21,22].

In our research out of 60 patients 6 (9.8%) patients had constipation. According to Nassar constipation occurred in 69.9% of the patients in intensive care unit and early (<24 hours) enteral nutrition was associated with less constipation[23].

Risk of nasogastric aspiration of food particles is higher when there is continuous use of sedatives/ neuromuscular blockers or moderate to high doses of inotropes /vasopressors[24]. In our study among 14 patients with nasal gastric feeding tube 8 (13%) patients feeds were interrupted due aspiration and absence of bowl sounds.

CONCLUSION

Most of the patients in our research were consuming less than 80% of the required calories and proteins. Main reasons of underfeeding was dietary noncompliance followed by nausea / vomiting and inappropriate caloric density of parenteral formulas.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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AUTHORS CONTRIBUTION

Maryam Zahid ,concept design analysis, Safdar Abbas ,principal investigator, Kaukab Sharjeel,conception, Hafsa Khalil, data analysis, Safdar Ali Khan, , interpretation, Shaista Nasim, data collection

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