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RESEARCH ARTICLE

NUTRITION ADEQUACY OF ETERNAL NUTRITIONAL SUPPORT IN CRITICALLY ILL PATIENT AT KING ABDULAZIZ HOSPITAL AL-AHSA

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Abstract

Background: This study was to determine the adequacy of nutritional support by assessing energy and protein intake for the first four days after initiation of enteral nutrition among critically ill patients.

Methods: The prospective, cross sectional study carried out in a medical intensive care unit in King Abdulaziz hospital Al Ahsa from September 2020 to November 2020. 130 patients were enrolled. Patients were scheduled to receive their ordered enteral nutritional requirements. Their intake was compared with their requirement based on ASPEN guidelines for critically ill patients.

Results: Majority of respondents were (54.5%) in the age group of 50 to 75 years, males with mean height of 163.9(± 7.098)cms and weight of 69.87 (± 8.862). Infection, wound, and Sepsis were major metabolic stressor with high number of respondents were having cancer (49.2%), PEG tube was inserted (64.4 %), During the first 4 days of tube insertion, the mean intake of calories and fluid (1432.31±176.24 versus 1704 ±175.01 k.cal p< .05) and fluid(1432.31±176.24 versus 1704 ±175.01 ml p< .05) was statistically lower and protein (117.99 +/- 18.05 g versus 87.98 +/- 22.14 g; p < .05) fat (66.25±16.25 versus 56.82 ±5.83 g, p< .05) was statistically greater for patients. Carbohydrate was (121.04±40.96 versus 180.32 ±27.07 g, p> .05) is statistically non-significant

Conclusions: The study result showed that under feeding was seen for energy and fluid among critically ill ICU patients and overfeeding was seen for protein, and fat. It is important to correct enteral nutrition intervention because that will help in tolerability of eternal feeding, duration of stay, economic burden on individuals and societies.

Introduction:-

Adequate nutritional delivery is essential to enhance and optimize the health of ICU patients. Different factors can affect the delivery and support of enteral nutrition for critically ill patients. There are patient-related factors, such as

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age, gender, nutritional status, severity of disease, and mechanical ventilation. Feeding formula, tube location, feeding initiation time, and administration rate are all feeding method and process factors that can affect the delivery of enteral nutrition. Frequent interruption of enteral nutrition is a possible factor to affect the delivery of nutrition, as well as under-prescription by physician (1). Considerations in deciding the type and amount of nutritional support depend on the underlying medical condition of the patient, the nutritional status, and the nutrient delivery route available (2). The optimal nutrient route of administration in the ICU minimizes problems related to feeding technique, providing optimal nitrogen balance, retaining lean body mass, and contributing to better clinical outcomes (3). Enteral feeding is the preferred method of administration to critically ill patients who cannot tolerate oral feeding. (4). However, it often fails to provide the adequate nutritional needs of the critically ill (5). This is a serious problem in critically ill patients because the loss of lean body mass, including cardiac and respiratory muscles, excessive weaning from mechanical ventilation, delayed wound healing, compromised immune host defenses, higher rates of infections, organ failure, as well as prolongation of hospital stay are correlated with underfeeding and protein depletion (6).There is restricted information about the sufficiency of enteral nutritional intake in Saudi Arabiaamong ICU patients. It is not accurate which reasons affect sufficient nutritional support and delivery in this population. Knowing these reasons will provide a basis for the progress of nutritional interventions that will get better clinical outcomes and survival of eternally fed patients in the Saudi Arabian ICU. The aim of this study was to determine the adequacy of nutritional support by assessing energy and protein intake for the first four days after initiation of enteral nutrition.

Materials andMethods:-

A cross sectional study was conducted in king Abdulaziz hospital Al Ahsa amongcritically ill patients on eternal feeding in medical ICU of King Abdulaziz Hospital Al Ahsa. Study approval was obtained from KAIMRC and IRB before data collection and also ethical clreance. It included patients admitted in intensive care unit with age range between 18 to 85 years, and both genders are included. Also, study excluded patients who are critically ill not on eternal feeding, under the age of 18,on paternal feeding or NPO. The hospital is located in North West Al-Ahsa city. BESTCARE system was used to collect secondary data for medical, biochemical, and clinical data. The duration of the study was from September 2020 to November 2020. Adequate sample size of 130 critically ill patient on eternal feeding was included in the study by a purposive sampling technique based on inclusion and exclusion criteria to reduce sampling error and to ensure representativeness. Collection of information regarding nutrition adequacy pre structured data collection form was used to collect data;variables (Age, Gender, Nationality), nutritional status (Anthropometric measurements, height, weight), dietary intake (type and quantity of formula), biochemical data (Albumin, Hb, CRP, Calcium), clinical data (Edema, fever, emaciation, diarrhea, distension). Energy requirement and macro nutrient requirement was based on ASPEN guidelines recommend the caloric goal in critically ill adult patients calculated through formula(25–30 kcal/kg/day). Data were checked for completeness and analysis by using SPSS software version 20.

Results AndDiscussion:-

Table # 1:- Demographic Characteristics data of the respondents:

Variable		Number	Frequency (%)
Age	25 - 50	9	6.9
	50.1 - 75	71	54.5
	75.1 - 85	50	38.6
Gender	Male	77	59.2
	Female	53	40.8

Table # 2:- Anthropometric data of the respondents.

Variable	Units	Mean	SD
Height in cms	Cms	163.9	± 7.098
Current weight in kgs	Kgs	69.22	± 9.037
Days in ICU	days	3.87	± 0.830
BMI		25.76	± 3.304

Table # 3:- Respondents medical history and metabolic stressors.

Variable		Number	Frequency (%)
Metabolic stressors	Post-op/Surgery	21	16.2
	Fever/Infection	32	24.6
	Wounds	32	24.6
	Trauma/Fracture	14	10.8
	Sepsis	31	23.8
Past medical history	CVD	13	10.7
	DM	31	23.3
	COPD	10	7.6
	CANCER	64	49.2
	CKD	12	9.2

From the table#1, it can be observed that the majority of the participants were males (59.2%) and were in the age group of (50.1-75 years) (54.5%). The mean height of respondents was 136.9 and SD (±7.098), Mean current weight in kg (69.22, SD±9.037), mean the days in ICU (3.87, SD±0.830), and the mean BMI of respondents (25.76, SD±3.304) is depicted in the table #2. Metabolic stressors reported (24.6%) have fever/infection, (24.6%) with wounds, (23.8%) sepsis, (16.2%) post-op/surgery, and participants that are on trauma/fracture were reported (10.8%). Participants who have past medical history were reported (24.6%) with cancer, (49.2%) DM, (10.7%) CVD, (9.2%) CKD, and participants who have COPD were reported (7.6%). In table #4 it can be notice that majority of respondents were on PEG tube (64.5%) compare to NGT tube feeding (35.4%) and majority of respondents were received feeding on day 3 of their admission to ICU (46.8%) followed by second day (29.6 %).Bar chart in figure#1 showing the type of formula given to respondents. Which indicate that higher percent of respondents (36.2%) receive Nepro, (29.2%) receive Resource, (23.1%) receive Glucerna, and (11.5%) receive Ensure.

Table # 4:- Respondents Nutrition support and type of formula.

Variable		Number	Frequency (%)
Type of feeding	NGT	46	35.4
	PEG	84	64.6
Days of tube incision	1 day of admission	30	23.6
	2 day of admission	38	29.6
	3 day of admission	62	46.8

Figure # 1:- Type of formula given to respondents.

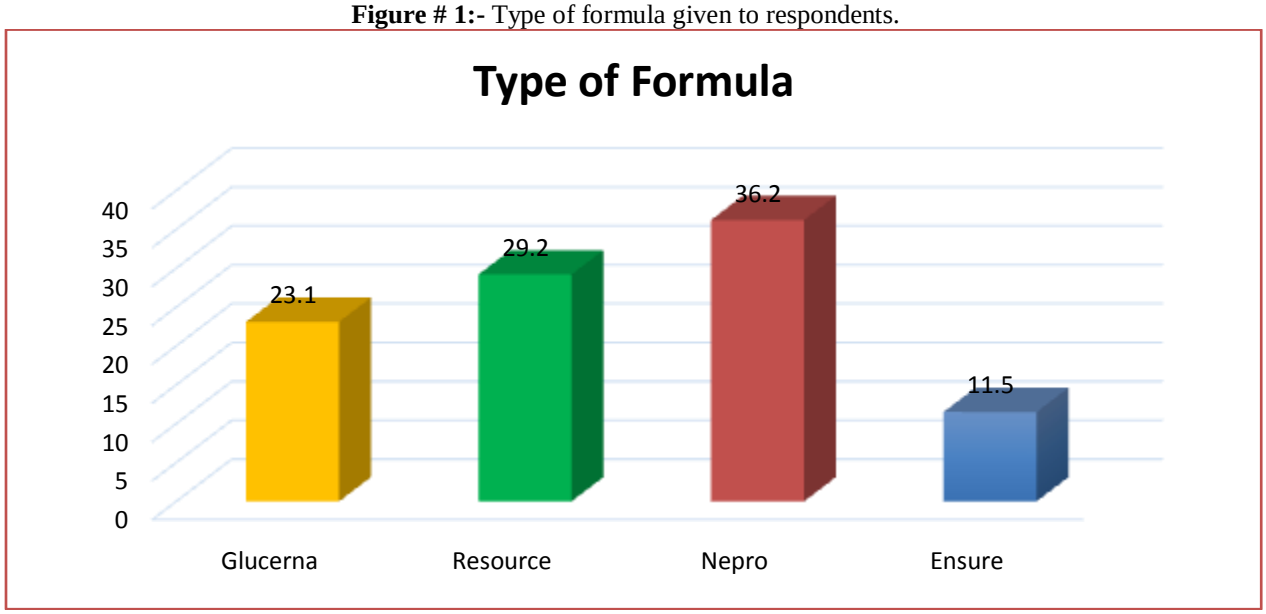

Table # 5:- Respondents Nutrient requirement.

Variable		Mean	SD	p-Value
Energy	Requirement	1704.65	175.01	0.003
	Intake	1432.31	176.24	
Protein	Requirement	87.98	22.14	0.04
	Intake	117.99	18.05	
Fat	Requirement	56.82	5.83	0.005
	Intake	66.25	16.25	
CHO	Requirement	180.32	27.07	0.443
	Intake	121.04	40.96	
Fluid	Requirement	1704.65	175.01	0.003
	Intake	1432.31	176.24	

From the table#5 it can be concluded that the mean energy and fluid intake of the respondents is significantly low compare to mean energy requirement (p-Value 0.003), Intake of fat and protein was highwith p-Value 0.005 and 0.04 respectively. There is no significant difference found in CHO intake (p-Value 0.443)

Similar results were seen in study conducted by Kim et.al (2012) (7) with estimated average daily caloric requirements 1,551.38 kcal and for intake patients received 51.6–64% of the goal energy intake because of elective discontinuation or delay.Taylor et al. [8] and Martin et al. [9] observed that patients who received a greater volume of enteral nutrition (EN) had better clinical results than those who received lower volume. These findings are in agreement with the results from the work of van Schijndel et al. [10] who conducted a prospective observational cohort study including 243 medical-surgical patients. They assessed the effects of achieving optimal nutrition in ICU patients during the mechanical ventilation on mortality and observed that female patients who reached their nutritional goals had better outcomes compared to those who did not. On the contrary, the beneficial effect of optimal feeding was not observed in male patients.

Table # 6:- Percent of Respondents Under fed, Adequate and over fed for Nutrients, Energy, protein, CHO, Fat and Fluid.

Variable	% of Underfed (20% below need)	% of respondents with Adequate need	Over fed 20% above needs
Energy K.Cals	64.4	31.8	2.3
Protein gms	67.4	21.2	9.8
Fat gms	4.6	33.8	60.8
CHOgms	58.9	29.5	11.6
Fluid ml	64.4	31.8	2.3

Percent of Respondents Nutrient intake for Macronutrients is depicted in the above table #6 shows adequacy of nutrient intake compare to their requirement base on ASPEN guidelines,(64.4 %) of respondents were underfed for energy, (76.4 %) for protein, (4.6 %) for fat, (58.9 %) for CHO and (64.4 %) for fluid, in other hand (2.3 %) overfed for energy, (9.8%) for protein, (60.8%) for fat, (11.6%) for CHO and (2.3%) for fluid. Adequate intake for macronutrients was observed among other respondents.

Researchers have found that providing lower calories than the measured requirements was associated with beneficial effects. A cohort study conducted by Zusman et al. [11] evaluated the clinical outcome according to the caloric administration ratein ICU patients: the mortality was lower in patients with at 70% AdCal/REE in comparison to those achieving a 100% AdCal/REE. In a randomized controlled study, Arabi et al. [12], examined the effect of permissive underfeeding compared with that of target feeding (caloric goal: 60%–70% compared with 90%–100% of the calculated requirement, respectively) on the outcomes of critically ill patients. Hospital mortality was lower in the permissive underfeeding group than in the target group (30.0% vs. 42.5%; relative risk, 0.71; 95% CI, 0.50–0.99; p = 0.04). Rice et al. [13] evaluated the benefits of initial lower-volume trophic enteral feeding in comparison to initial full enteral feeding in patients with acute lung injury: compared with full enteral feeding, initial trophic enteral feeding for up to 6 days did not improve ventilator-free days, 60-day mortality, or infectious complications, but it was associated with less gastrointestinal intolerance. Similar results were reported by Rice et al. [14] who

compared the initial trophic EN with full-energy EN in mechanically ventilated patients. In this study, the 2 approaches resulted in similar clinical outcomes (including ventilator-free days, ICU-free days and mortality to hospital discharge), but initial trophic EN resulted in fewer episodes of gastrointestinal intolerance.

Conclusion:-

To conclude, critically ill patients commonly have higher REE than healthy individuals. maintaining health of patient is numerous challenges in medical care unit. Especially nutritional state with ICU patient. It is important for avoiding malnutrition, reducing complications, and duration of stay. As enteral nutrition has proven beneficial effects in critically ill patients. The study result showed that under feeding was seen among critically ill ICU patients that did not meet the patient nutrition needs. It is important to correct enteral nutrition intervention depend on the patient information and state individually because that will help in duration of stay, economic burden on individuals and societies. This research is cross sectional design, so more research to be done on this topic to improve outcomes of the patient health and length of stay in ICU. In addition, further research covering many hospitals in the Saudi Arabia

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Conflict of Interest:
The authors declare that they have no competing interests.

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