

NUTRITION IN END-STAGE LIVER DISEASE

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NUTRITION IN ESLD – PRACTICAL ISSUES

- Issues involving assessment of nutritional status.
- Issues involving energy and nutrient requirement.
- Issues involving nutritional management.

CHILDREN WITH ESLD

- Children with ESLD – extremely vulnerable to nutritional compromise.
- Children with ESLD – poor nutritional management – major negative impact on long-term outcome and survival – both pre- and post-LT.

(Leonis MA, Balistreri WF. Gastroenterology May 2008; 134(6): 1741-1751).

NUTRITIONAL STATUS ASSESSMENT

- Anthropometry – most practical option.
- Upper body measurements most reliable, not easily influenced by CLD changes.
- TSF and MUAC most accurate from clinical standpoint. Ht. – useful indicator of chronic undernutrition.

(Taylor RM, Dhawan A. Journal of Gastroenterology and Hepatology 2005;20:1817-1824).

NUTRITIONAL STATUS ASSESSMENT (contd..)

- Subjective global assessment(SGA) well validated in adults but not in children, normal and healthy or in disease – not reliable.
- DEXA – very accurate for research purposes but not practical as a clinical bedside option.

(Taylor RM, Dhawan A. Journal of Gastroenterology and Hepatology 2005;20:1817-1824).

GOALS OF NUTRITIONAL ASSESSMENT

- Start assessment early, monitor regularly.
- Complete medical history, detailed physical examination from standpoint of nutrient deficiency/toxicity.

GOALS OF NUTRITIONAL ASSESSMENT(contd...)

- Biochemical indicators of nutritional status(limitations) – urinary creatinine to height ratio reliable indicator – if no renal compromise :-

Creatinine-height ratio = $\frac{24 \text{ hr. ur. cr of pt}}{24 \text{ hr. ur. cr of age, sex \& ht. matched healthy child}} \times 100$.

GOALS OF NUTRITIONAL ASSESSMENT(contd...)

- Nutritional assessment once every 3 months
 - Body weight(despite limitations), height(indicator of stunting), TSF and MUAC.
- 72 – hour dietary recall/ food frequency questionnaire.

ENERGY REQUIREMENT

- For male patients: $BEE = 66.5 + (13.7 \times \text{weight in kilograms}) + (5 \times \text{height in centimeters}) - (6.78 \times \text{age in years})$.

For female patients: $BEE = 655 + (9.56 \times \text{weight in kilograms}) + (1.85 \times \text{height in centimeters}) - (4.68 \times \text{age in years})$.

(Shepherd RW. J Gastroenterol Hepatol May 1996; 11(5): S 7-10), (Kelly DA. Pediatr Transplant Aug 1997; 1(1): 80-84), (Bashes NR et al. J Pediatr Gastroenterol Nutr Jul. 2006; 43(1): 89-94), (Campos AC et al. Curr Opin Clin Nutr Metab Care May 2002;5(3):297 – 307)

ENERGY REQUIREMENT(contd..)

- In patients with clinically significant edema calculate energy needs based on adjusted body weight or estimated dry weight, as follows:
- Adjusted body weight = (ideal body weight - actual body weight) X 20% + ideal body weight.
- To calculate estimated daily caloric requirements, multiply BEE by the stress factor and by the activity factor.

ENERGY REQUIREMENT(contd..)

- Adjust BEE for the added stress of operation, disease, infections, and wounds as follows:
 - For elective operation, multiply BEE by 1.2.
 - For wound or infection, multiply BEE by 1.5.
- Adjust the BEE for activity, as follows:
 - For patients confined to a bed, multiply by 1.2.
 - For patients allowed very light activity, multiply by 1.3.
 - For patients allowed light activity, multiply by 1.5.
 - For patients allowed moderate activity, multiply by 1.6.
 - For patients allowed light activity, multiply by 1.5.
 - For patients allowed moderate activity, multiply by 1.6.

PROTEIN REQUIREMENT

- The estimated protein requirements in infants, children, and adolescents are as follows:
 - Age 0-6 months - 2.2 g/kg body weight
 - Age 6-12 months - 2 g kg/body weight
 - Age 1-3 years - 0.18 g/cm height
 - Age 4-6 years - 0.21 g/cm height
 - Age 7-10 years - 0.21 g/cm height
 - Age 11-14 years - 0.29 g/cm height
 - Age 15-18 years - 0.34 g/cm height

VITAMINS & MINERALS

- According to RDA:-

For Indian children, use most recent 2011 updated ICMR (NIN, Hyderabad) recommendations – Nutritive value of Indian Foods – available on ICMR website.

NUTRITIONAL MANAGEMENT - ESLD

- ESLD:-
 - Liver Cirrhosis
 - Liver Transplantation

NUTRITIONAL MANAGEMENT – LIVER CIRRHOSIS

- Use supplemental enteral nutrition when patients cannot meet their caloric requirements through oral food despite adequate individualised nutritional advice.
- Not able to maintain adequate oral intake from normal food, use:-
 - Oral nutritional supplements (C) or
 - Tube feeding (even in presence of oesophageal varices) (A)

(Plauth et al. ESPEN Guidelines on Enteral Nutrition in Liver Disease .Clinical Nutrition 2006; 25 : 285-294).

NUTRITIONAL MANAGEMENT- LIVER CIRRHOSIS(contd..)

- PEG placement associated with higher risk of complications - not recommended (C).
- Type of formula :-
 - Whole protein formulae - generally recommended (C).
 - More concentrated high-energy formulae in patients with ascites (C).
 - Use BCAA-enriched formulae in patients with hepatic encephalopathy arising during enteral nutrition(A).
 - The use of oral BCAA supplementation can improve clinical outcome in advanced cirrhosis(B).

NUTRITION IN LIVER CIRRHOSIS - SUMMARY

- Overall outcome:-

Enteral nutrition improves nutritional status and liver function, reduces complications and prolongs survival in cirrhotics and is therefore recommended (A).

NUTRITIONAL MANAGEMENT – LIVER TRANSPLANTATION

(Plauth et al. Clin Nutr 2006; 25:285-294)

Indication

Preoperative	Follow recommendations for cirrhosis.	
Postoperative	Initiate normal food/enteral nutrition within 12–24 h postoperatively.	B
	Initiate early normal food or enteral nutrition after other surgical procedures.	B

Application

Preoperative	Follow recommendations for cirrhosis.	
Postoperative	For children awaiting transplantation consider BCAA administration.	B
	Recommended energy intake: 35–40 kcal/kgBW/d (147–168 kJ/kgBW/d)	C
	Recommended protein intake: 1.2–1.5 g/kgBW/d	C

Route

Preoperative	Follow recommendations for cirrhosis.	
Postoperative	Use nasogastric tubes or catheter jejunostomy for early enteral nutrition.	B

NUTRITIONAL MANAGEMENT – LIVER TRANSPLANTATION (*Contd....*)

Type of formula		
Preoperative	Follow recommendations for cirrhosis.	
Postoperative	Whole protein formulae are generally recommended.	C
	In patients with ascites prefer concentrated high-energy formulae for reasons of fluid balance.	C
	Use BCAA-enriched formulae in patients with hepatic encephalopathy arising during enteral nutrition.	A
Outcome		
Preoperative	An improvement of perioperative mortality or complication rate by preoperative tube feeding or oral nutritional supplements has not yet been shown. However, a clear recommendation for nutritional therapy in undernourished patients with liver cirrhosis is supported by the statements concerning nutrition in LC made in statement 2.4.	C
Postoperative	Early normal food or enteral nutrition is recommended for transplant and surgery patients with LC in order to minimise perioperative—in particular infectious—complications.	B

Thank you for your patient
listening!