LOW COST NUTRITIONAL ASSESSMENT OF SURGICAL PATIENTS IN THIRD WORLD COUNTRIES

Pages with reference to book, From 86 To 89

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Abstract

Nine nutritional parameters, viz; height, weight, maximal arm circumference (MAC), triceps skin fold thickness (TST), maximal calf circumference (MCC), abdominal girth at umbilicus (AGU), hemoglobin, total WBC count and absolute lymphocyte count were measured in 22 male and 1 6 female surgical inpatients admitted to the surgical and gynaecological services of the Holy Family Hospital. These variables were compared with the values obtained from 22 male and 19 female volunteer controls, and with Western norms. Randomisation was ensured by including all patients present in a ward area or subdivision on a particular day of study. The only exclusions were patients on traction, patients with plasters, and critically ill patients. Patients admitted to general ward, semi-private rooms and private rooms were all included in the study (JPMA 37: 1987).

INTRODUCTION

Comparing the body mass index with norms established in the Western world, 41% males and 38% females were undernourished, 18% males and 31% females were obese (normal BMI = 20-25 for males, 19-24 for females); triceps skin fold thickness (TST)-12% of females were obese, there were no obese males. (Normal values for TST upto 15mm for males and upto 25 mm for females). None of the males had a haemoglobin level less than 10 g/dl whilst 12.5% females had a haemoglobin less than 10 g/dl; 26% of males and 11% of females had an absolute lymphocyte count below the normal range of 1,500 -3,500 cumm.

Whilst the proportion of under-nourished patients is not as high as that seen in the government run hospitals, we have nevertheless, a distribution of obese, under-nourished and normally nourished patients utilizing paying facilities at the Holy Family Hospital.

The nutritional status of a nation or community is an indicator of its state of health and socioeconomic development, an indirect index of the effectiveness of health delivery pro -grammes indicates the effectiveness of immunisation programmes, sanitation and water supply, and the dietary habits of the community. To the surgeon in 3rd world countries, assessment of the nutritional status is important as both obesity and malnutrition have harmful effects, and determine the outcome of operations.

A patient with protein energy malnutrition (PEM) is unable to cope with increased postoperative energy requirements: PEM causes impaired immunocompetence[1,2] that results in increased wound sepsis rates. Poor healing[3] is often associated with low serum albumin levels. PEM also causes decreased synthesis of transport proteins, achlorhydria, reduced secretion of bile and immunoglobulin A, and hence colonisationof the gut with pathogenic bacteria and fungi Cardiac output is reduced and renal function impaired resulting in an inability to respond to increased plasma volume by naturesis and to excrete ammonia and hydrogen ions in times of need[4]. Overall, PEM patients withstand surgery poorly with an increase in mortality and morbidity. Conversely, there is a reduction in operative mortality and morbidity in patients who have received adequate pre and postoperative nutritional support[5]. Many conditions such as burns, sepsis, major trauma, pancreatitis, major intestinal and biiary fistulae etc., can cause or aggravate PEM, and some diseases such as tuberculosis affect the nutritionally deprived.

Obese patients present other problems6[6,7]
The short neck makes it difficult to intubate, ventilation is compromised, and postoperative atelactasis is common. Intertrigo beneath voluminous folds of skin, becomes an ominous source of endogenous infection. Glucose tolerance is low. These patients often have wound infections and resultant incisional herniae. Obesity makes it difficult to shift the patients, and the patients move little in bed by themselves, encouraging deep venous thrombosis. In this group, coronary artery disease, hypertension and cardiac hypertrophy contribute to increased, mortality and morbidity. Gall bladder disease, hiatus hernia, breast and endometrial cancer are more commonly seen.
Malnutrition and obesity are often missed unless immuno competence, anthro pometric and biochemical variables are specifically measured, and signs of vitamin deficiency are specifically looked for. lmmunocompetence is determined by absolute lymphocyte count and reaction to various skin test allergens. Biochemical variables that need determination are serum total proteins, albumin and transferrin. The anthropometric parameters include various physical measurements. The weight height ratio expressed as BMI i.e., weight in kilogramsdivided by the square of the height •in meters is a general guide to nutritional status. Triceps skin fold thickness and other skin fold thickness measure the body fat, and hence in starvation will give a measure of the length of starvation. The arm muscle circumference rather than the mid arm circumference assesses the skeletal muscle mass, whilst the serum albumin and transferrin assess visceral body cell mass. Serum transferrin because of its shorter haif lire (8 days as compared to 20, for serum albumin) is a better guide to fluctations in visceral body mass[8].

PATIENTS AND METHODS

Nine nutritional parameters viz., Body Mass Index (BMI) (W (kg)/[H(M)]2, Maximal Arm Circumference (MAC), Triceps Skin Fol Thickness (TST), Abdominal Girth at the umbilicus (AGU), Maximal Calf Circumference (MCC), Haemoglobin and absolute lymphocyte count were measured in 22 male and 16 female patients admitted to the surgical and gynaecological wards of the Holy Family Hospital. The present study constitutes Phase I of a continuing study and was aimed at obtaining information on as many of nutritional parameters as possible without additional cost to the patient. The entire study was done without any additional expense to the patient (Hb and total and differential leucocyte counts are done in all patients admitted to the surgical ward). Visceral body mass indicators such as transferrin and albumin were not assessed, and inimunocompetence was judged by the absolute lymphocyte count.
To ensure randomisation, all patients in one section of a ward or its subdivision were examined on a particular thy. The only patients not included in the study were those with fractures treated in plaster, those in traction and those. operated on the preceding day. Patients admitted to the general wards, semi-private and private rooms were all included in the study.
Measurements except haemoglobin and absolute lymphocyte counts were also carried out on 22 male and 19 female volunteers from the staff of the hospital. All these volunteers received, in addition to salary, free food from the hospital, which we thought was nutritious, and included breakfast, lunch, dinner and two teas for full time employees. It was presumed that these persons were adequately nourished. Male volunteers included the enquiry office staff and the kitchen staff, and the female subjects were chiefly drawn from amongst the nursing staff.
The height was measured by a vertical extension rod, weight by a beam balance, Body Mass Index was calculated by the formula weight in kilograms divided by square of the height in meters. For the Triceps Skin fold thickness, a fold of skin was lifted off the back of the middle of the triceps and a callipre measurement was made 2 cm below that point. Abdominal girth was measured at the umbilicus with the patient supine. Maximal Arm Circumference was measured additionally to assess muscle size.

The readings were recorded on a proforma.

RESULTS

Using the BMI standard, 41% males and 38% females were undernourished. 12.5% females had, in addition, a low haemoglobin (below l0g/dl). The normal absolute lymphocyte count ranged from 1500-3000 per cu mm. We have therefore classified all patients with a count below 1500/mm^3 as immunodeficient. 11% of females and 26% of males had a jeopardised immunocompetence. Other authors consider patients with counts below 2000 as immunocompromised. 18% males and 31% females had excess weight and 12% females showed excess fat by TST measurement (Tables I, II, III).

TABLE I
Values Showing Anthropometric Measurements.

	B.M.I.		T.S.T. (cm)		A.G.U. (cm)		M.C.C. (cm)		M.A.C. (cm)	
	Controls	Patients	Controls	Patients	Controls	Patients	Controls	Patients	Controls	Patients
Males	21.84	21.03	0.81	0.85	73.28	76.89	32.43	29.45	25.76	24.51
Mean s.d.	3.33	3.40	0.25	0.27	9.78	9.64	1.85	3.88	2.76	3.22
Females	21.72	22.38	1.26	1.58	72.88	79.97	31.54	28.16	26.26	25.72
Mean s.d.	4.36	1.71	0.41	0.65	6.03	11.85	4.62	3.31	3.68	4.32

BMI: Body Mass Index; TST: Triceps Skin Fold Thickness; AGU Abdominal Girth Umbilicus; C: Maximal Calf Circumference; MAC: Maximal Arm Circumference.

TABLE II

Undernourishment, Jeopardised Immunocompetence and excess Weight in Patients as assessed by BMI, TST, Hb and Absolute Lymphocyte Count.

	MALES	FEMALES
UNDERNOURISHMENT		
Hb. below 10 g	0	12.5%
BMI below 19. (Females) below 20 (Males)	41.0%	38.0%
JEOPARDISED IMMUNOCOMPETENCE		
Absolute Lymphocyte count below 1500/cu mm	26%	11 %
EXCESS WEIGHT		
By BMI standard	18 %	31 %
Obesity by TST Standard	0	12 %

TABLE III

Obesity and Undernourishment Assessment by BMI and TST.

B.M.I.					T.S.T.				
	Patient		Control			Patient		Control	
	No.	(%)	No.	(%)		No.	(%)	No	(%)
Males					Males				
BMI Upto 20	9	(41%)	8	(38%)	TST upto 1.5	22	(100%)	20	(95%)
20–25	9	(41%)	8	(38%)	TST 1.5	0	(0%)	1	(5%)
over 25	4	(18%)	5	(24%)					
Total	22		21		Total	22		20	
Females					Females				
BMI upto 19	6	(38%)	7	(35%)	TST upto 1.5	8	(50%)	15	(75%)
19–24	5	(31%)	9	(45%)	1.5–2.5	6	(38%)	5	(25%)
over 25	5	(31%)	4	(20%)	over 2.5	2	(12%)	0	(0%)
Total	16		20		Total	16		20	

DISCUSSION

Of all the anthropometric measures, the weight in relation to the height of the individual remains the most convenient measure of malnourishment. Some undernourished patients may have a higher proportion of water to proteins in the cell, and surgical patients may become logged in the postoperative period but, by and large, the body mass index is an accurate guide to the nutri tional status.

Tables showing established norms, relating weight to height, are available (such as the Metropolitan Ufe Insurance Tables) but their use is more cumbersome and involves checking the expected weight for a particular height according to sex, and then calculating the percentage difference to evaluate if the individual is obese or underweight. Moreover, BMI does not need to be corrected for body frame size'[10] We have compared the number of patients who were obese or malnourished by the BMI standard as against comparison with life insurance tables and found no statistical difference (Table IV).

TABLE IV
Assessment of Obesity and Undernourishment.
BMI as compared to Metropolitan Life Insurance Tables.

	PATIENTS		CONTROLS	
	BMI	Metro-politan	BMI	Metro-politan
Below Ideal Weight	39.5%	27.7%	36%	36.8%
Above Ideal Weight	25.5%	27.7%	22%	18.42%

Changes in BMI vary with age from population to population. Burr[11]' found that 1ST and BMI both declined with age after 70 years in the Welsh as previously reported in the British population in general, while Americans seem to retain more fat. None of our patients were over 73 years of age. Abdominal girth at umbilicus and maximal calf circumference are not mentioned in any of the reports on nutritional survey. We felt that measurement of the abdominal girth was important, because many of the patients who come to us for a cholecystectomy have fat, prout berant and often pendulous bellies. We felt that maximal calf circumference measurement provides better opportunity to assess muscle protein mass as the gastrocnemii and soleus muscles present a considerably larger bulk and hence the changes in bulk will be more easily apparent.

Assessment of serum albumin as an additional parameter of nutrition is of inestimable value and will add little to the cost of patient care in a surgical ward. This study, does not assess albumin levels.

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