International Journal Dental and Medical Sciences Research
Volume 3, Issue 1, Jan-Feb 2021 pp 1065-1070 www.ijdmsrjournal.com ISSN: 2582-6018

The Role of Immunonutrition in Major Elective Abdominal Surgery

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Submitted: 02-02-2021 Revised: 18-02-2021 Accepted: 22-02-2021

ABSTRACT : The study aims to investigate the effect of Immunonutrients on patients undergoing Elective Major Gastrointestinal surgery by assessment of changes in the clinical outcome in terms of postoperative complications compared to a normal diet. It is a Case control study conducted from December 2014–December 2015,in a tertiary medical center which included 50 patients who underwent major elective gastrointestinal surgery for benign and malignant diseases. The primary outcome measured was the rate of infectious complications, and the secondary outcome was length of postoperative period.
KEYWORDS: Immunonutrition, Postoperative complications

I. INTRODUCTION

Surgery, infection, injury and stress all these factors pose a catabolic state by the presence of an inflammation and thereby depletion of conditionally essential nutrients leading to increase in the risk of postoperative complications and eventually delaying the recovery and enhances the overall morbidity of the surgical patients. Inspite of advancement of modern surgical practices, minimal surgical trauma and newer generations of antibiotics and improved perioperative care in the recent years, the increase in postoperative infection rate is still of great concern. The role of nutrition in the recovery from trauma or surgical insult has been researched by clinicians since the period of Hippocrates. Poor nutritional diet or deficiency of individual nutrients markedly alters the numerous factors of wound healing. The role of Immunonutrients as a supplemental nutrition in electivegastrointestinal surgery and modulating the inflammatory response and improvement in postoperative outcome is to be evaluated .

The intestinal barrier is of major importance as the distal small bowel and colon contain enormous concentration of bacteria. Under extreme clinical conditions like surgery and stress the intestinal barrier function is impaired, resulting in the movement of bacteria and toxins to the systemic circulation .This process of bacteria and its products moving across the intestinal mucosal barrier and with a systemic spread is known as bacterial translocation. Enteral nutrition supplies the intestinal mucosa and maintains Gut associated lymphoid tissue and decreases the bacterial translocation to the portal vein.The integrity of the mucosal barrier and functioning immune system are prerequisites for adequate gut function. The concept of gut barrier failure and bacterial translocation lead to the major impetus of initiation of early enteral feeding after injury. Enteral feeds maintain the intestinal structural integrity by increasing the mucosal mass, enhancing luminal epithelial cell proliferation ,maintaining villus height and stimulating the brush border enzymes.Enteral feeding preserves the intestinal barrier function better than parenteral route.

Malnutrition and immune dysfunction are synergistic and most often occur in hospitalized patients. Gastrointestinal malignant patients are more susceptible for malnutrition due to poor oral intake and cachexia. Immunonutition as a modality of intervention dates back to 3000 years in ayurvedic medicine. Malnutrition has increased the infection rate from 0.1% in the well nourished to 18% in the malnourished. The organisms measles,tuberculosis and pneumocystitis carnii are more susceptible in immune compromised patients. Malnutrition has an impact on wound healing.Protein catabolism can result in a delay in wound healing. A hypoalbumineamic patient experiences wound dehiscence ,with the albumin level of <2 gm/dl and protein supplementation can reverse this effect.

Immunonutrition

Defined as the addition of specific nutrients in greater than normal concentrations, to modulate the immune function. It has been recently coined as pharmaconutrition. It constitutes of ARGININE, GLUTAMINE, FISH oil. BCAA, NUCLEOTIDES, vitamins and minerals and can be administered enterally and parenterally.

Glutamine is essential for protein and nucleotide synthesis.Maintains gut barrier function. It contributes to the formation of mucin surface

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integrity of the intestinal epithelial cells .Increases the synthesis of heat shock proteins which are paramount for cellular recovery and protection of organ failure. Arginine is considered a semi-essential amino acid. Supplementation with arginine has been shown to have beneficial effects on the immune response by improving the response of peripheral blood cells to mitogen, enhancing natural killer cell activity, and increasing lymphokine activated natural killer cell populations. Omega 3 FA substitutes for the Arachidonic acid in the macrophages and neutrophil, and hence blunts the production of proinflammatory mediators. It competes for the cyclooxgenase and lipooxgenase and inhibits the production of Arachidonic acid metabolites.

IMMUNONUTRIENT FORMULA

Energy	Kcal	337.4
protein	gm	20
carbohydrate	gm	63
fat	gm	0.6
L-glutamine	Mg	500
l-arginine	Mg	3000
DHA	Mg	80
Linoleic acid	Mg	32
taurine	Mg	38
colostrum	Mg	2
vitamin C	Mg	83
vitaminE	Mg	33.3
vitamin K	Mg	50
vit A	Mcg	1812
biotin	Mcg	30
vit D	Mcg	2.2
Essential minerals		
Iron	Mg	18
Zinc	Mg	11
Selenium	Mg	15
Magnesium	Mcg	200
Calcium	Mg	1200
Copper	Mcg	410
molybdenum &chromium	Mcg	35
phosphorus-	Mg	700

Materials and Methodology:

50 patients received immune-enhanced oral nutrition preoperatively,who underwent major elective GI surgery for both benign and malignant diseases with IMN supplementation. The study group n=50 where administered 30 gms of IMN formula three times a day for 5 days preoperatively by oral route.The control group were given a normal diet during the study period.The preoperative variables measured were weight,BMI.The post operative variables are the primary outcomes of infectious complications such as SSI,UTI,pneumonia ,wound abscess and anastomotic leaks were recorded.

Inclusion criteria:

All patients above 13years of age.
Planned for elective major Gastro intestinal surgery

Exclusion Criteria :

Intestinal obstruction.
Vomiting and diarrhea.
Diabetes mellitus.
Pregnancy
No evidence of liver and renal disease

Statistical Analysis:

II. RESULTS & OBSERVATIONS

Surgeries are done as illustrated in the chart below according to the clinical diagnosis made earlier.There were 11 types of surgeries done on 50persons of case group- the details of which are appended below.

A similar number of surgeries were done on the control group of fifty persons also to monitor the effect of the intervention of nutrition on the case group.

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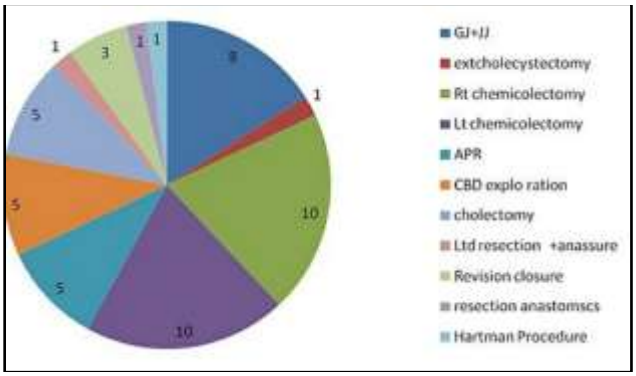
Details of surgery	
GJ+JJ	8
extcholecystectomy	1
Rt hemicolectomy	10
Lt hemicolectomy	10
APR	5
CBD Exploration	5
Cholecystectomy	5
Ltd resection +anastomosis	1
Revision closure	3
resection anastomosis	1
Hartman Procedure	1
Total	50



The impact of nutrients

The data collected on the 50 patients of case group on parameters of weight and BMI are appended below- before and after the intervention of added immuno nutrition by oral intake.

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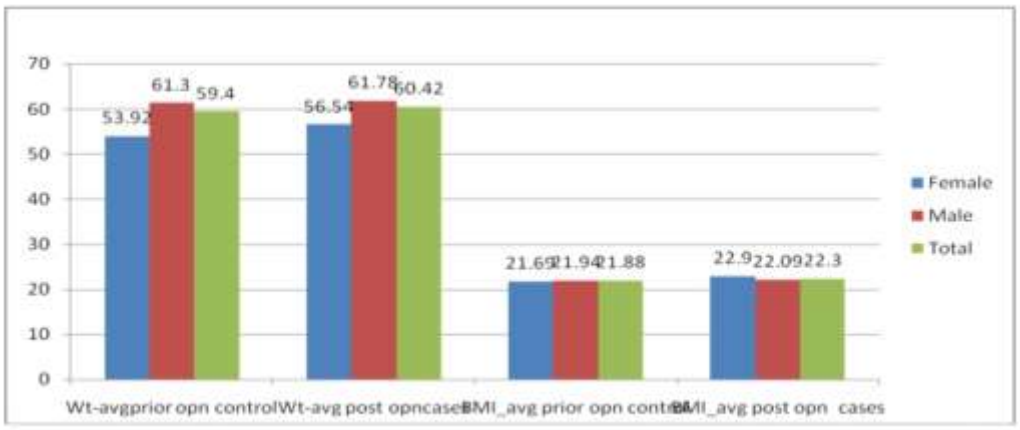
Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Hieght - Preop	Case	50	1.6470	.07702	.01089
	Control	50	1.6442	.06737	.00953
Weight - Preop	Case	50	59.40	5.901	.834
	Control	50	60.42	5.296	.749
BMI - Preop	Case	50	21.8776	1.46839	.20766
	Control	50	22.3704	1.82726	.25841
Height - Postop	Case	50	1.6470	.07702	.01089
	Control	50	1.6442	.06737	.00953
Weight - Postop	Case	50	60.42	5.296	.749
	Control	50	59.50	4.925	.696
BMI - Postop	Case	50	22.30305	1.746991	.247062
	Control	50	22.03404	1.732114	.244958



Pneumonia

Considering the attack of pneumonia only.. 5 patients got suffered in the case group whereas this is as high as 36 % in the standard group. The p <0.05 is significant . The P value is 0.001

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.767[b]	1	.001		
Continuity Correction [a]	9.237	1	.002		
Likelihood Ratio	11.498	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	10.658	1	.001		
N of Valid Cases	98				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10. 78.

Wound infection

The case group was affected by 36% and the control group by an enhanced level 50%. It can be confidently assessed that immunonutruients has a significant impact on the patients in reducing factors which help to increase the symptom of wound infection.

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Crosstab

			Group		
			Case	Control	Total
Wound infection - Day 3	Yes	Count	15	24	39
		% within Group	31.3%	48.0%	39.8%
	No	Count	33	26	59
		% within Group	68.8%	52.0%	60.2%
Total		Count	48	50	98
		% within Group	100.0%	100.0%	100.0%

Abd abcess

irrelevant to comment on comparision.

Anastomotic Leak

The control group with absence of added nutrients intervention reported a occurance of one patient while it is none on the case group.

Others

The control group had a single instance complication.

Length of stay

Both the groups have registered a totally negative incidences during the study period making it

The average hospital stay of the case group was 14.82 days while that of control group was higher at 16.78 days, indicating a reduction of 12% on hospital stay . The lower number of hospital stay along with better quality of life at hospital undoubtedly help to conclude that the intervention with immunonutrients on patients has a positive impact on healing.The above said point are best illustrated by the table and the bar diagram shown below.

Post operative complications

Symptoms	Cases	Controls
UTI	1	2
Pneumonia	5	18
Wound infection	18	25
Abd abcess	-	-
Anastomotic leak	-	1
Avg Los	14.82	16.17

III. CONCLUSION:

The study outcome has proved a beneficial reduction of infectious complications and substantial improvement with the immunonutrient formula and it emphazies the subset of malnourised patients are markedly benefitted .

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