EFFECT OF VALUE-ADDED HEALTH MIX ON SURGICAL OUTCOME AND NUTRITIONAL STATUS OF THE SELECTED PARTICIPANTS

PUSPANJALI MISHRA
RESEARCH SCHOLAR, OPJS UNIVERSITY, CHURU, RAJASTHAN

DR. BALRAM KUMAR PANDEY
RESEARCH SUPERVISOR, OPJS UNIVERSITY, CHURU, RAJASTHAN

ABSTRACT

Diabetes imposes a substantial cost burden to society and, in particular, to individuals with diabetes and their families. The main aim of the study is Effect of value-added health mix on surgical outcome and nutritional status of the selected participants**.** The methodology followed for the present study is involved in five phases. Health is the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person 's mind, body and spirit, usually meaning to be free from illness, injury or pain, as in ‗good health ‗or healthy.

Keywords; Surgical, Nutritional, Health, Diabetes.

- **INTRODUCTION**

Diabetes imposes a substantial cost burden to society and, in particular, to individuals with diabetes and their families. Reducing the potential for health problems caused by diabetes through more intensive disease management would help to decrease the national expenditure on diabetes healthcare services, while significantly improving the quality of life for people with diabetes. Estimated diabetes costs in 2002 were $132 billion, accounting for both direct and indirect costs (American Diabetes Association [ADA], 2003). Direct medical costs of diabetes were $92 billion (ADA). Indirect costs, which include disability, work cost, and premature death, comprised the remaining $40 billion of the total diabetes costs (ADA). People with diabetes are at a greater risk of becoming disabled due to amputations, loss of vision, and other physical problems and are more likely to miss workdays due to diabetes related complications than individuals who do not have diabetes (ADA).

Type 1 diabetes accounts for 5-10% of all diagnosed cases of diabetes (CDC, 2005). Type 1 diabetes is an autoimmune disease that cannot be prevented, typically diagnosed in children and young adults. The disease results when the body's immune system destroys pancreatic beta cells

responsible for producing insulin. Insulin serves as the signal for glucose uptake into cells, so defects in insulin action or production starves the body's cells of energy in the form of glucose (ADA, 2007a). Because the body is unable to produce insulin, the hormone must be provided through insulin injections or an insulin pump (CDC).

Type 2 diabetes is the most prevalent form of diabetes, accounting for 90-95% of all diagnosed cases (CDC, 2005). In the past, type 2 diabetes was identified as adult onset diabetes; however, this term is no longer accurate due to the increased incidence of type 2 diabetes among adolescents accompanying the national rise in adolescent obesity (Pinhas-Hamiel et al., 1996). The increasing prevalence of type 2 diabetes is also associated with the national rise in metabolic syndrome, a condition characterized by insulin resistance, which can progress to type 2 diabetes if left untreated (American Heart Association, 2007). Type 2 diabetes begins when cells fail to properly use insulin produced by the pancreas and gradually the disease progresses to where the pancreas no longer has the ability to produce insulin (CDC). Type 2 diabetes is potentially controllable before permanent beta cell failure occurs (Wing, 1995). Elevated blood glucose concentrations, overweight, and a sedentary lifestyle are all reversible risk factors of type 2 diabetes (Knowler et al., 2002).

- **LITERATURE REVIEW**

Mageswari U S., Tamilarasi P. (2011), The weight loss plan of the 21st century probably indulges Mediterranean, Asian, and vegetarian ingesting styles in phrases of low-fats, low-salt, excessive-fiber meals respectively. Despite growing knowledge in the direction of fitness and nutrients, the new view of food specializes in achieving most beneficial fitness without any deficiency diseases and complications due to existing lifestyle diseases. But people have intuitively acknowledged the term ―health‖ as blessings of good food intake over centuries as mentioned in the proverb ―one should eat to live, not live to consume.‖ Over the short time period, a nutrient-deficient eating regimen compromises day-to-day health and fitness. Specifically, colorful plant pigments like pink in tomatoes, the orange in carrots, and the yellow in squash are crucial to the function of certain blood cells that hold the body against microbial invaders.

Borneo and Leon, (2011), Cereals play a crucial role of the human food plan from the start of agriculture due to the evolution of positive civilizations accord with the cultivation of cereal grains. Nature has stored the elements for the germination and growth of the germ which includes starch, fat, protein, mineral salts and vitamins. Scientific research proves that regular intake of whole grains reduces the dangers of many health problems including lifestyle diseases such as cardiovascular diseases, strokes, hypertension, metabolic syndrome, diabetes and even prevents most of the cancer.

Kuijsten et al., (2015), Diet and nutrition are strongly implicated in the etiology of Type 2 diabetes whereas low dietary fibre intake could be an important factor. Evidence from prospective observational studies has suggested that it may be low cereal fibre intake, rather than low fruit and

vegetable fibre intake, which is particularly important Kuijsten et al., also reported the prospective associations between cereals including dietary fibre sources and Type 2 diabetes risk in the European Prospective Investigation of Cancer and Nutrition (EPIC) and the results presented strengthen the evidence implicating cereal with fibreas an important determinant of Type 2 diabetes risk and suggest that randomised controlled trials examining the effect of cereal based supplementation on Type 2 diabetes risk are needed.

Jenkins et al., (2018), Low-glycemic index diets may improve both glycemic control and normal lipid profile for patients with Type 2 diabetes. A randomized, parallel study design by Jenkins at a Canadian university hospital research center of 210 participants with Type 2 diabetes treated with antihyperglycemic medications who were recruited by newspaper advertisement and randomly assigned to receive one of two diet treatments each for six months with the intervention of high-cereal with fibre or low-glycemic index dietary advice resulted in moderately lower HbA(1c) levels compared with a high-cereal with fiber diet.An increase of high-density lipoprotein cholesterol in the low-glycemic index diet by 1.7 mg/dL were also noted (95% CI, 0.8-2.6 mg/dL) compared with a decrease of high-density lipoprotein in high fibrous cereal diet.

- **METHODOLOGY**

The methodology followed for the present study is involved in five phases.

PHASE I: Identification of the participants

One of the most important sign and symptoms of diabetes was delayed wound healing and needs to have extra medical and nutritional care and support to prevent the further consequences and complications of diabetes mellitus. The selected lower limb injured Type 2 diabetic subjects (N=483) ,despite of the wound(open and closed wound) category, both the groups were considered for further dietary intervention as the prevalence rate of surgical site infection (SSI) was common among surgical diabetic subjects.

The dietary intervention was assessed through the efficacy of value added health mix on health status, hypoglycemic effect and surgical outcome especially wound healing among the selected lower limb injured Type 2 diabetic subjects (N=483). The participants for nutrition intervention were selected on the basis of Ganga Hospital Injury Severity Score (GIHSS) for open injuries without critical illness. The information regarding socio economic profile, dietary and life style pattern ,health profile , medical history, nutritional screening, anthropometric measurements and biochemical investigations which have effect on surgical outcome and nutritional status were also collected

PHASE II Effect of value-added health mix on surgical outcome and nutritional status of the selected participants

Among the selected 483 subjects, based on the inclusion and exclusion criteria 80 participants were selected. Research study design, duration of the study and expected surgical outcome of the research study were explained and oriented to the selected participants (N=80).Purposive sampling method is used to select the lower limb injured Type 2 diabetes aged between 25-55years participants and to find out the effect of dietary intervention on surgical outcome and nutritional status of the selected participants.

- **RESULTS**

Phase I Identification of lower limb injured Type 2 diabetic subjects

1. Socioeconomic profile of lower limb injured Type 2 diabetic subjects

Rapid economic growth resulted in significant socioeconomic, demographic, nutrition and health transitions within the country and leading to double burden of malnutrition due to the coexistence of chronic energy deficiency and overweight in the population driven by influences of urbanization and migration to cities and a disproportionate expansion of settlements within urban slums has resulted in an unhealthy lifestyle because of changes in traditional eating habits, decreased physical activity, exposure to stress and so on (Ramachandran, 2017). Table 4.1 and represent the socioeconomic status of the selected lower limb injured Type 2 diabetic surgical subjects.

Table 1. Demographic profile of the selected subjects

Category Age (years)	Male			Female	
	N		%	N	%
<30	42		13	23	15.4
31-40	28		8	15	10
41-50	182		55	62	41.3
51-55	81		24	50	33.3
Total	333		100	150	100
Educational qualification Illiterates	23		7	29	19
Primary	48		14	13	9
High School	61		18	14	9
Degree	169		51	76	51

Professional	32		10	18	12
Total	333		100	150	100
Occupation	3		1	1	1
Doctor					
Engineer	35		11	9	6
Teacher	28		8	35	23
Private(Industrial)	32		10	8	5
Marketing& sales	155		47	12	8
Business	42		13	7	5
Farmers	21		6	6	4
Homemakers	--		-	48	32
Total	333		100	150	100

Table 1 indicates that 55 percent of the male lower limb injured type 2 diabetic subjects were in the age group of 41 to 50 years. Similarly 41 percent female were also in the same age group. When the education level was considered, the illiterate rate of female subjects was slightly higher side (19 percent) than the male (7 percent) subjects. It is evident that majority of the selected male subjects were in marketing, sales and business category and female subjects were home makers

2. Dietary pattern of lower limb injured Type 2 diabetic subjects

Dietary pattern plays a significant role in human health. Improper and inadequate dietary intake pattern have resulted in the deficiency of essential nutrients especially during growth periods, injury and illness (Togo et al, 2011). Dietary habit of the people has changed drastically, with the change to the fast life style pattern leading to faulty food intake at improper interval. Table 2 shows the type of diet and various meal pattern among the selected lower limb injured Type 2 diabetic subjects.

Table 2 Dietary habit and Meal pattern of the selected subjects

Dietary Habit	Male(N=333)		Female(N=150)		Total(N=483)	
	Number	Per cent	Number	Per cent	Number	Per cent
Pure Vegetarian	49	14.71	27	18	76	15.73
Lacto ovo vegetarian	65	19.52	42	28	107	22.15
Non vegetarian	219	65.76	81	54	300	62.11
Meal pattern -No of Meals consumed per Day						
<2meals	65	19.52	27	18	92	19.05
>4 meals	174	52.25	110	73.33	284	58.80
3meals	94	28.23	13	8.67	107	15.73

Table 2 also revealed that more than 50 percent of the selected Type 2 diabetic subjects with lower limb injury were Non Vegetarian and were 65.76 per cent male and 54 percent female. Lacto ovo vegetarians were 22.15 percent, followed by people who take pure vegetarian (15.73 per cent).While considering meal pattern about 58.80 percent of the selected subjects were taking more than four meals per day. A percent of 15.73 subjects were took three meals per day. It clearly indicates that the higher prevalence of obesity is due to improper dietary pattern. These observations were similar to the studies of Dietary habit relation with skipping of meals (Lee an Yoon, 2014).

i.   Food consumption pattern of lower limb injured Type 2 diabetic subjects
Food frequency is important in gathering data on food availability, food access and variety. Traditionally, nutrition research has focused on individual nutrients, and more recently dietary patterns, consumption of variety of foods greatly influences the health of the population. Inclusion of foods from all the food group in a day's diet of person prevents the occurrence of deficiency diseases. Table 3 highlights the food consumption pattern of the selected lower limb injured Type 2 diabetics.

Table 3 Food consumption pattern of the selected subjects

Food Group		Male(N=333)		Female(N=150)	
(Daily)	Number of Servings/Day	N	Per cent	N	Per cent
	4-6	151	45	65	45
Cereal	6-8	127	38	56	39
	<4	55	17	24	17
Millets	4-6	92	28	40	2
	<4	140	42	60	40
Pulses	4-6	122	37	52	35
	<4	216	64	93	64
	3-4	125	37	53	36
Vegetables	<3	161	48	69	46
	>4	53	16	23	15
	2-3	78	24	34	22
Fruits	>3	36	11	16	10
	<2	223	67	96	64
Milk and milk	2-4	216	65	92	62
products	>4	48	15	21	14
	Nil	74	22	32	2
Non vegetarian	2 or 3	51	15	22	15
foods	=1	124	37	53	35
(weekly)	>3	23	7	10	7
	2-3	162	49	70	46
Snacks	<2	141	42	61	40
	Nil	34	10	15	10
	5	40	12	17	11
Water	6-8	132	40	56	38
(Glasses)	>8	141	42	61	40
	<5	25	8	11	7

From the Table 3, it was clear that 45 percent male took more than six serving of cereals in a day but at the same time, took less servings of vegetables (48 per cent) and fruits(67 per cent) not even one serving per day. Twenty three percent of male were non vegetarians and consumed foods more than three times per week compared to females (7 percent). Snacking pattern also high among males (49 per cent). Millet consumption was totally less among both male and female of 42 percent and 40 percent respectively

ii. Mean nutrient Intake of the selected Lower limb injured Type 2 diabetic Subjects

Before admission to the hospital food intake have direct relation on the nutrient intake ,often affected by many factors such socio economic status, life style habits and health condition of the people. Table 4 presents the mean nutrient intake of the selected subjects before admission to the hospital using 24 Hours recalling method. Ten percent of the total subjects (33 per cent - Male) and (15 per cent- Female) were considered for the calculation of mean nutrient intake of the selected lower limb type 2 diabetic subjects.

Table 4.4 Mean nutrient Intake of the selected subjects

Nutrients	Males (N = 33)				Females (N = 15)			
	RDA	Actual		Excess/Deficit	RDA	Actual		Excess/Deficit
Energy (kcal)	2300	2880	24.13		1900	2270	19.47	
Protein (g)	60	28	-20		55	30	-45.5	
Fat (g)	25	40	60		20	32	60	
Dietary fiber (g)	40	12	-70		40	14	-65	
Calcium (mg)	600	452	-24.67		600	418	-30.33	
Iron (mg)	17	20	17.65		17	12	-29.41	
Vitamin-C (mg)	40	30	-25		40	35	-12.5	
Thiamine(mg)	1.2	1.4	16.6		1	1	0	
Riboflavin (mg)	1.4	1.6	14.2		1.1	1	-9.09	
Niacin(mg)	16	18	12.5		17	19	58.33	

Table 4 showed that mean energy and other nutrient intake (24 hour recall method) of the selected 10 percent of the total subjects were low compared to the RDA (ICMR 2010) for both adult men and women. The Calorie intake of the men and women was excess percent respectively whereas protein percent was deficit for both gender of the selected subjects. This was same as evident from the study by Rao et al, (2011).

Even though the selected subjects followed the diabetic diet at home, the consumption of fiber was low and deficit among both the gender respectively. The calcium content of the diet was deficient having -24.67 per cent low compared to ICMR RDA (2016). Whereas iron intake was 17.6 percent excess in males and 29.1 percent deficit in the selected female subjects. The vital nutrients such as

protein, fiber ,calcium and vitamin C intake were -20, -70, -24.67 and -25 per cent respectively were deficit in male subjects and - 45.5,-65,-30.3, -12.5 per cent deficit in female subjects along with - 29.41 percent deficit intake of Iron in the female subject diet.

This showed that the calorie through carbohydrates and fat were higher compared to the other nutrient intake which is an indicative measure of the excess deposition of fat and higher blood sugar levels due to lower intake of fiber content.

iii. Meal skipping of hospital diet among the selected lower limb injured Type 2 diabetics during hospitalization

Meal skipping is the omission or poor consumption of one or more of the traditional main meals (breakfast, lunch or dinner) throughout the day (Taskar et al,2016) and the regular omission of meals, particularly the breakfast meal, has been associated with poorer diet quality, lower intakes of total energy, vitamins and minerals increased risk of central adiposity markers of insulin resistance and cardio metabolic risk factors (Pereira et al, 2011).

Table 4.5 Meal skipping habits among the selected during hospitalization

Skipping of meal	Male(N =333)		Female(N=150)	
	No	Percent	No	Percent
Skipped	62	19	68	45
Not skipped	271	81	82	55
Breakfast	20	32	42	62
Lunch	36	58	16	23
Dinner	6	10	10	15
Reason for skipping Consistency/Texture Taste Appearance	30 18 14	48 29 23	26 23 19	38 34 28

Table 5 - shows that 45 percent of women and 19 percent of male subjects skipped any one part of the meal. Many of them (58 percent)skipped the lunch due to their consistency (48), taste (29) and appearance(23).The percent of women who skipped breakfast were comparatively higher (62 Percent) having the same reason. As the percentage of male and female did not showed interest in taking hospital food which was not same as home food.

• CONCLUSION

Health is the level of functional or metabolic efficiency of a living being. In humans, it is the general condition of a person's mind, body and spirit, usually meaning to be free from illness,

injury or pain, as in ‗good health‘ or healthy. Health and wellbeing are the basic concern of every nation. Their health is not only an indication of socio-economic status and standard of living of the country but it also reflects the values and beliefs of the society. Among several factors which influence the quality of life, nutrition with the combination of life style pattern is the most important factor in the promotion and maintenance of health status of an individual and prevention of Non communicable diseases (NCD) considered as the life style diseases becoming major public health problems in the country (WHO, 2016).

REFERENCE

1. Jenkins D.J. (2018), Effect of a low-glycemic index or a high-cereal fiber diet on type 2 diabetes: a randomized trial. JAMA,300 (23): 2742-53.
2. Borneo, R. and León A.E. (2012)Whole grain cereals: functional components and health benefits. Food Funct.,3(2):110-9.
3. Mageswari U S., Tamilarasi P. Dietary sodium intake in normal and selected diabetics, hypertensives and hypotensiveswith diabetes. The Indian Journal ofNutritionalDiabetics 2011, 27:200-204.
4. Kuijsten et al.,(2015)Dietary fibre and incidence of type 2 diabetes in eight European countries: the EPIC-InterAct Study and a meta-analysis of prospective studies. InterAct Consortium. Diabetologia., 58(7):1394-408.
5. Larsen et al.,(2011)Diets with High or Low Protein Content and Glycemic Index for Weight-Loss Maintenance. N Engl J Med., 363:2102-2113
6. Layman, D.K and Rodriguez, (2019) N.R. Egg protein as a source of power, strength and energy.Nutrition Today., ,44(1):1-6.
7. Le ,NTD., Dinh, Pham L., Quang,Vo T. (2017)Type 2 diabetes in Vietnam: a cross-sectional, prevalence-based cost-of-illness study. Diabetes Metab Syndr Obes., 10:363-374.
8. Leandro-Merhi, V.A., de Aquino, J.L., Sales Chagas J.F.(2017).Nutrition status and risk factors associated with length of hospital stay for surgical patients. Parenter Enteral Nutr.,35(2):241- 8
9. Lee ,Y.M., Han, S.I., Song ,B.C., Yeum,K.J. (2015).Whole grain cereals for the primary or secondary prevention of cardiovascular disease. J Med Food., 18(11):1179-86.
10. Kyle, U.G., Genton, L., Pichard C. (2015). Hospital length of stay and nutritional status. Curr Opin Clin Nutr Metab Care., 8:397–402.