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Impact of Nutrition Education and Counselling on Nutrient Intake of Type 2 Diabetics of Different BMI Group

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Abstract

Nutritional Counselling is important in preventing diabetes, managing existing diabetes, and preventing, or at least slowing, the rate of development of diabetes complications. It is, therefore, important at all levels of diabetes prevention. Nutritional Counselling is also an integral component of diabetes self-management education. Nutrition counselling should be sensitive to the personal needs, willingness to change, and ability to make changes of the individual with pre-diabetes or diabetes. The present study was conducted to find out theImpact of Nutrition Education and Counselling on Nutrient Intake of Type 2 Diabetics of Different BMI Group. A sample of 180 subjects was chosen for the study and were divided into two strata , stratum I consisting of subjects suffering from diabetes since the past 5 years and stratum II suffering from diabetes since the last 10 years. Obese, Normal and Underweight Diabetics were included in the study . Each category included 15 males and 15 females in both the strata. Data on nutrient intake was collected both prior and after the nutritional therapy. In both the strata before the counselling the obese subjects were consuming Energy, Carbohydrate and Fats higher than the RDA. The Energy intake was 134-164 per cent of the RDA, and the Carbohydrate was 94-133 per cent of the RDA .For the underweight subjects the consumption of all the Nutrients was inadequate in comparison to the RDA, except fat. Normal weight subjects were consuming nearly adequate amounts of all the nutrients except for Fats which was markedly higher than the RDA. Further all the BMI groups were noted to consume inadequate amount of Fibers in their daily diet. Considering the Protein intake , it was inadequate for all the BMI groups except for obese and normal where the intake was sufficiently adequate in comparison to the RDA. But after the counselling was imparted to the subjects, a significant difference was noted in the intake of all nutrients by all the subjects in both the strata. The level of nutrient intake was found to be sufficiently adequate to the recommended values for all the groups in both the strata except fats which was still consumed in amounts higher than the RDA by all the groups. The intake of carbohydrates decreased to 97 per cent in obese males and reached to the adequate values of around 100 per cent in reference to the RDA in obese females in both the strata. Also the Fiber intake increased in all the groups in both the strata. Thus the Nutritional Status in terms of Nutrient Intake was found to be sufficiently adequate after counselling as compared to prior counselling. Also it is to be mentioned that a non-significant difference was noted in consumption of all the nutrients in both the strata prior and after counselling. Thus the results of the study revealed that nutritional counsellingis highly beneficial for Diabetic patients because dietary control is very important to control blood sugar levels.

Key words: Type I2 Diabetes,Body Mass Index, Nutritional Status, Nutritional Therapy, Recommended Dietary Allowances, Nutritional Counselling

I. INTRODUCTION

India today is continuously making all efforts towards further development and being one of the developed nations of the world. When politicians and social workers see India moving towards progress, Medical persons, Nutritionists see India topping the charts of some diseases and heading towards others, Diabetes Mellitus is one of them. Diabetes Mellitus is a syndrome of impaired Carbohydrate, Protein, and Lipid metabolism caused by either lack of insulin secretion or decreased

sensitivity of the tissues to insulin (Guyton and Hall, 2001). The causes of Indians being more susceptible to the disease are genetics, sedentary lifestyle, stress and consumption of unhealthy food items. Diabetes is of two types basically type 1, type 2, however other forms like Gestational Diabetes Mellitus, Malnutrition related Diabetes Mellitus are also known now. Type 2 Diabetes is the most common form of Diabetes, usually occurring in Adults. Obesity, poor diet, physical inactivity, advancing age, genetics are some of the known causes of type 2 Diabetes. It is to be mentioned that the number of people with type 2 Diabetes is increasing and the age at which it occurs is decreasing. This rise is associated with economic development, increasing urbanisation, dietary changes, reduced physical activity. Dietary Management is an essential component of the approach pack to control Diabetes. Moreover diabetic patients are many times faced with problems of excessive hunger, weakness and dietary management provides an effective way to cope with such problems. The programme of diet follows divide meals and conquer disease (Laliberte, 2003).The mortality rate of Diabetics is nearly 4-5 folds increased over Non Diabetics(ADA,2001). Thus diabetes needs to be managed and controlled, and a person with well controlled diabetes can lead a normal life even with the disease, and can prevent further complications. But for this, the patients need to be made aware about the disease, and taught to manage it with drugs, insulin and diet. Moreover the others also need to be made aware of a healthy lifestyle, a healthy balanced diet .Problems like Obesity invite Type2Diabetes in susceptible individuals.

Achieving nutrition-related goals requires a coordinated team effort that includes the person with diabetes and involves him or her in the decision-making process. It is recommended that a registered dietician, knowledgeable and skilled in nutrition therapy, be the team member who plays the leading role in providing nutrition care. However, it is important that all team members, including physicians and nurses, be knowledgeable about nutrition counselling, support its implementation.

To be one of the contributors helping patients in the successful management of Type 2diabetes and aspiring to give a healthy life, free of complications to them, the present study was carried out assessing the Nutrient Intake of a sample of patients with type 2 diabetes, imparting Nutrition Education to them and further evaluating the impact of the effort carried out. The present study was carried out to find Impact of Nutrition Education and Conselling on Nutrient Intake of type 2 Diabetics of Different BMI Group

II. MATERIALS AND METHODS

Selection of samples:

Formation of an appropriate sample is the milestone of any research study. For the current investigation 180 type 2Middle Aged Diabetic patients were selected. They were divided into two strata, stratum I, comprising patients suffering from Diabetes since the last 5 years and stratum II suffering from diabetes since the last 10 years. Further each stratum was divided on the basis of BMI (Body Mass Index) into 3 categories i.e. Obese, normal weight and underweight. Further equal number of males and females were studied under each category. They were taking oral hypoglycaemic drugs only and not insulin and were registered as outdoor patients at Sardar Patel Medical College, Bikaner. All the subjects were belonging to the middle income group and were residing in the urban area of Bikaner city.

Collection of General Information:

To conduct any research study and seek specific information, first a general idea needs to be built about the subjects. This was done through collection of general information like age, sex, religion, income, education, occupation. Next specific information was collected like age at the onset of disease, duration of disease, associated diseases, and symptoms occurring on hyperglycaemia. All this was essential to carry out the study successfully.

Dietary survey and Nutrient intake:

A package of medication and dietary control is an absolute necessity for the effective control of any disease. Especially diabetes is one such disease in which dietary control must be exercised to effectively manage blood sugar levels. Thus in the first part of the study a dietary survey using the 24 hour recall method was carried out. The subjects were requested to report about their Dietary Intake for the previous day(24 hour recall). The information about raw quantity taken for cooking as well as the cooked food by the patients was recorded in terms of household measures/ numbers/kg, to find out thequantum of raw food intake. From the cooked and raw amounts of foods the raw amount consumed by each patient was then calculated. The mean intake of different foodstuffs consumed were then computed for a day and compared with the suggested intake for diabetics by Raghuram(1996), Raghuram*etal*. and Khurana(2003). Further the level of adequacy was expressed in terms of percent intake to RDA.

Nutritional Counselling and Nutrient Intake

The subjects were then imparted Nutrition Education for three months concerning the disease. Information in reference to the disease , the dietary control that needs to be exercised , requirement of specific nutrients and their amount that should be taken was explained in simple terms. A book titled *"madhumehkesathjiyemastise"* was prepared which gave a complete picture of diabetes , its management and the complications which would occur, if not kept under control. After imparting the necessary guidelines again data on Nutrient Intake was collected and analysed to assess as to how far the objective of the imparting Nutrition Education to the subjects, to improve their daily diet and manage Type2 diabetes was reached.

III. Results and Discussions

The results obtained from the present investigation as well as relevant discussion have been summarised in terms of nutrient intake by different BMI group of type 2 diabetics.

Majority of the subjects were Hindus (93.33 %). More than 73per cent subjects were vegetarian. 85 per cent subjects were leading sedentary life style. Higher percent of male subjects were noted to be educated &employed . The mean age of occurrence of diabetes was 47.0 years and 46.2 years for the subjects of stratum I and stratum II, respectively (Table 1) . Results revealed that incidence of diabetes was earlier in females as compared to males, but the difference was not significant. This may be due to the fact that menopause also occurs in between the age of 45-55 years and menopausal women are at a high risk of diabetes due to hormonal changes. Mayer *et al*. (1994) also found that there is a greater incidence of higher blood glucose level and diabetes after menopause as compared to pre-menopausal stage. Comparing the data on BMI basis, obese and underweight subjects were having slightly earlier prediction of diabetes than normal weight group . But the difference found was not significant. Data on different nutrient intake was calculated before and after counselling and compared with different strata and BMI group.

Energy- The data collected and analysed revealed that the overall mean intake of energy prior to counselling was 104.99 per cent and 107.88 per cent of RDA, in stratum I and II respectively (Table 2). Discussing the different BMI groups separately, Obese males and females in both the strata were consuming Energy in more than adequate amounts, (134-164%)of RDA. The Normal weight subjects were consuming amounts which were slightly higher than the RDA, (103-112%) of RDA, while the underweight subjects were consuming less than the required amounts, (70-76.99%) of RDA. The table below shows these results. But after the counselling was imparted highly significant ($p<0.005$) change was observed in the intake of energy by the Obese and the Underweight groups. In Obese males the intake of energy decreased to 101.60 per cent of RDAand 100.71 per cent of RDA in stratum I and

stratum II respectively. In Obese females also the intakes decreased to the required amounts of 101.32 per cent and 103.00 per cent of RDA in stratum I and stratum II respectively. The above figures can be labelled as adequate. In Normal weight individuals in males and females of both strata the intakes were calculated as (99-101.33%) of RDA, which can be labelled as sufficiently adequate. Beneficial results were also observed for the underweight category. The underweight males increased their intakes to 98.72 per cent and 99.55 per cent of RDA in stratum I and II respectively, whereas the underweight females increased their intake to 93.87 per cent and 94.44 per cent of RDA in the first and the second strata respectively. The above values can be labelled as almost near to adequacy. Further a non significant difference prior and after counselling was noted in between the two strata.

Carbohydrate- Carbohydrates supply the bulk of the daily Energy. But they need to be supplied in requisite amounts and the form needs to be changed that is simple forms of carbohydrate have to be avoided and complex form needs to be administered for patients of Diabetes. In the present study Obese males were noted to consume more than adequate amounts of carbohydrate in both the strata, (120.36% and 133.00% of RDA in strata I and II respectively). The Obese females were noted to consume sufficiently adequate amounts (94.00%, 101.77%) of RDA in strata I and II respectively (Table 3). A moderate to sufficiently adequate intake was noted in normal weight subjects in both the strata (83.77% - 93.33%) of RDA in both the strata. However the underweight group showed a decreased intake of carbohydrate as compared to RDA (64.81-69.44%) of RDA in both the strata.

But after counselling highly significant($p<0.005$) difference was observed in carbohydrate intake in all groups. The Obese males in strata I and strata II decreased their intake to 97.99 per cent and 97.22 per cent of RDA respectively and the Obese females to 101.33 per cent and 102.28 per cent of RDA. The above values can be labelled as adequate. The Normal weight males showed an increase in Carbohydrate intake to appropriate value of 99.66% and 100.35 per cent of RDA while the females to 99.66 per cent and 100.39 per cent of RDA in strata I and II respectively. The underweight individuals also took benefit of the counselling and their intake ranged from (93.61-101.66%) of RDA in both the strata which was sufficiently adequate.Further a non significant difference prior and after counselling was noted in between the two strata.

Proteins: Data on Nutrient intake of Proteins revealed that in majority of the subjects both the females and males were consuming proteins in amounts which inadequate in comparison to the RDA. It was only the Obese males in both the strata who were consuming adequate amounts of Proteins. But after counselling the intake increased in all the BMI groups in both strata. Obese females of stratum I increased their intake to 92.44 per cent and the normal weight females to 100.00 per cent (Table 4). The Underweight males and females increased their intake to 92.11 per cent and 86.99 per cent respectively. The above results hold true for stratum I .

In stratum II a similar increase was noticed, the normal weight males increased their intake to 112.00 per cent which was slightly higher than the RDA while the normal weight females to 104.66 per cent which was almost near to the RDA. The underweight males and females did show an increase but it was still less as compared to the RDA, (89.44and 86.55% of RDA).Further a non significant difference prior and after counselling was noted in between the two strata.

Fat-Diabetics are prone to diseases of the heart thus the total quantity of fat needs to be reduced and polyunsaturated fats need be consumed in the diet. Overall mean intake of fats prior to counselling was 57.9 grams and 58 grams in strata I and II respectively. That is the intake was 289.5% and 290% of RDA (Table 5). In all the three BMI categories obese males and females in both the strata were consuming the highest amount. Even the normal weight and the underweight category were consuming fats in amounts which were considerably high in comparison to the RDA.

Nutrition Education bring about highly significant changes($p<0.005$) in the consumption of fats but the intakes were still high as compared to the RDA. After counselling the fat intake in the obese males of stratum I was 141.33 per cent of the RDA while in the obese females of the same strata it was recorded to be134.00 per cent of the RDA. In stratum II the intake was 138.00 per cent and 136.00 per cent of the RDA in obese males and females respectively. The normal weight individuals also consumed fats in amounts which was less than the obese group but still high in comparison to the RDA in both the strata (115.55% and 117.55%) of RDA, in normal weight males and females of stratumI and 116.00 per cent and 111.55 per cent of RDA in males and females of stratum II respectively. The Underweight category were consuming fats in amounts which were marginally higher than the RDA (107.22%,110.88%)of RDA in Underweight males and females of stratum I and 112.88% and 107.22% in underweight males and females of stratum II respectively. The above data suggests that fat intake is relatively high in Indian diets. Further a non significant difference prior and after counselling was noted in between the two strata.

Fiber- Inclusion of Fiber is very essential for all but is especially essential for patients of Diabetes because it keeps blood sugar levels within control, provides satiety in addition to its role in providing bulk to intestinal contents. As seen in the tables below the overall mean intake of Fibre prior to counselling 10.00 and 10.66 in strata I and II respectively, which was very less when compared to the RDA (Table 6).

But after the Nutrition Education was imparted a highly significant change was observed in all the BMI categories in both the strata. In the obese group the intake was 86.85-102% of RDA, whereas in the Normal Weight category it was observed to be around 100% in both the strata. The Underweight category did increase their consumption of Fibre and their intake was found to be between 78 per cent -90.55 per cent of RDA, but could still be increased.

IV. Conclusion:

Prior to counselling, the intake of energy was noted to be 'markedly more' than the adequate in obese group, whereas in normal weight group the intake was 'sufficiently adequate or more and in underweight group the intake was 'slightly inadequate' as compared to the RDA. Sufficient intake of carbohydrates was noted for obese and normal weight subjects except for underweight subjects where the intake was noted to be 'inadequate' toRDA. Also, intake of simple carbohydrates was noted to be more in practice among the subjects. Intake of fats was 'markedly higher' by all the groups, with the overall mean 289.5 and 290.0 per cent of RDA for stratum I and II, respectively. Intake of proteins was noted to be 'inadequate' for all BMI groups except for obese and normal weight males where the intake was 'sufficiently adequate' to the recommended allowances. Overall mean intake of fibres for the two strata prior to counselling was noted to be 28.5 and 30.2 per cent of RDA which was 'highly inadequate'.

But after the counselling intake of all the nutrients significantly changed and were noted to be 'sufficiently adequate' in obese, normal weight and under weight subjects except for fats. Although a significant reduction was noted in fats consumption after the counselling but still the intake was found to be 'markedly higher' than the RDA.

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Table 1 : Mean age (in years) of diagnosis of the diabetics

BMI	Obese		Normal weight		Underweight		**Total**		Overall
	M	F	M	F	M	F	*M*	F	
Stratum I *Age(yrs)±S.E.*	47.2 ± 2.26	45.4 ± 1.95	48.2 ± 1.72	48.3 ± 1.87	47.5 ± 1.71	45.7 ± 1.71	47.6 ± 1.13	46.4 ± 1.06	47.0 ± 0.77
ratum II Age(yrs)**±S**	46.7 ± 1.96	44.5 ± 1.78	47.5 ± 1.87	49.4 ± 1.73	45.5 ± 1.71	43.7 ± 1.78	46.5 ± 1.07	45.8 ± 0.99	46.2 ± 0.73
F Value	0.24	0.534	1.042	0.981	2.10	0.699	1.67	2.08	0.194

Table 2- Mean Energy intake (Kcal) by the Diabetic subjects prior and after counselling
Stratum I

Energy(kcal)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	2245.5	1880.0	1769.7	1660.3	1333.6	1281.9	1782.9	1607.4	1678.4
±SE values	±60.69	±36.70	±31.2	±12.21	±45.6	±35.9	±61.9	±37.4	±37.68
% RDA	160.33	134.20	110.66	103.77	74.00	71.22	111.44	100.44	104.99
After Counselling	1422.6	1418.5	1613.9	1588.7	1777.0	1689.7	1604.5	1565.6	1585.0
±SE values	±40.36	±22.15	±24.30	±10.55	±25.90	±28.80	±18.9	±15.8	±13.04
% RDA	101.60	101.32	100.86	99.29	98.72	93.87	100.28	97.81	99.06
T Value	8.63***	7.18***	3.04***	1.16	5.11***	5.76***	2.88***	1.55	3.32***

Stratum II

Energy(kcal)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	2299.8	1881.1	1805.1	1693.4	1385.5	1277.4	1830.1	1617.3	1723.3
±SE values	±44.61	±38.86	±45.35	±17.62	±39.20	±45.80	±60.57	±43.34	±38.70
% RDA	164.00	134.00	112.88	105.88	76.99	70.99	114.33	101.00	107.88
After Counselling	1410.9	1442.0	1620.8	1597.1	1791.0	1700.0	1607.5	1579.9	1593.7
±SE values	±24.25	±29.30	±25.63	±12.56	±14.94	±34.03	±16.40	±20.90	±15.10
% RDA	100.71	103.00	101.33	99.81	99.95	94.44	100.46	98.74	99.60
T Value	111.70 ***	6.74***	3.02***	1.15	4.84***	3.68***	3.83***	1.21	3.49***
F Value Prior counselling	0.520	2.262	0.316	2.350	1.096	1.010	0.570	0.721	0.830
alue after counsel	1.544	0.074	0.892	1.982	0.004	2.194	0.238	1.392	1.090

***** Significant at 0.5 % level.**

Table 3- Mean Carbohydrate intake (Grams) by the Diabetic subjects Prior and after counselling

Stratum I

Carbohydrate (gm)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	294.9	230.3	261.4	234.6	205.1	204.9	253.8	228.3	238.5
±SE values	±12.70	±6.01	±8.36	±5.37	±5.50	±5.70	±7.67	±3.77	4.55
% RDA	120.36	94.00	93.33	83.77	65.11	65.04	90.66	81.55	85.11
After Counselling	240.04	248.4	279.0	279.2	315.0	294.9	278.1	274.1	276.05
±SE values	±7.59	±2.34	±4.04	±3.48	±5.30	±6.35	±4.62	±3.12	2.79
% RDA	97.99	101.33	99.66	99.66	100.00	93.61	99.33	97.88	98.55
T Value	5.02***	0.30	3.03***	3.83***	6.98***	4.54***	0.42	4.16***	2.64**

*****Significant at 0.5% level** ****Significant at 1% level**

Stratum II

Carbohydrate (gm)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	325.97	249.4	248.5	255.4	218.7	204.3	264.4	236.4	250.4
SE values	±7.95	±8.50	±7.25	±3.04	±4.88	±7.00	±7.82	±5.06	±4.86
% RDA	133.0	101.77	88.77	91.21	69.44	64.81	94.42	84.42	89.42
After Counselling	238.2	250.6	280.1	281.1	320.2	300.7	279.5	277.4	278.4
+-SE values	±6.35	±4.60	±3.90	±2.12	±4.87	±6.41	±4.10	±4.75	±3.14
% RDA	97.22	102.28	100.35	100.39	101.66	95.46	99.82	99.07	99.42
T Value	9.00***	1.14	3.83**	6.25***	2.86***	4.77***	1.04	2.82**	2.43**
Value Prior counselli	2.087	2.341	0.353	1.286	1.391	0.004	0.965	1.070	1.270
value after counselli	1.650	0.180	2.012	1.494	0.783	2.065	0.832	0.944	1.250

Table 4- Mean Protein Intake (Grams) by the Diabetic Subjects, prior and after counselling.

Stratum I

Protein(gm)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	66.9	58.9	58.5	47.3	40.6	36.6	55.4	47.6	51.5
SE values	±4.69	±3.38	±2.34	±2.09	±2.20	±1.85	±2.48	±1.98	±1.63
% RDA	101.33	89.24	90.00	72.76	54.13	48.80	85.20	73.22	79.23
After Counselling	65.0	61.0	72.5	65.1	69.1	65.2	68.8	63.7	66.2
+-SE values	±2.06	±2.84	±2.82	±1.21	±1.88	±2.87	±1.30	±1.48	±1.02
% RDA	98.44	92.44	111.55	100.00	92.11	86.99	105.88	98.00	101.92
T Value	1.44	1.60	2.57**	2.62**	7.71***	6.38***	3.90***	3.15***	3.38***

Stratum II

Protein(gm)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	71.8	46.8	63.5	42.1	39.7	36.0	58.3	41.6	50.0
±SE values	±3.08	±4.08	±1.89	±2.51	±1.89	±1.64	±2.44	±1.77	±1.74
% RDA	108.88	70.90	97.69	64.76	52.90	48.00	89.66	64.00	76.92
After Counselling	67.5	64.0	72.9	68.0	67.1	64.9	69.1	65.6	67.3

±SE values	1.47	±3.58	±3.55	±1.21	±1.24	±1.08	±1.40	±1.30	±1.04
% RDA	102.22	96.99	112.00	104.66	89.44	86.55	106.33	100.92	103.53
T Value	0.41	3.34***	3.08***	6.66***	8.00***	8.60***	3.94***	5.37***	4.78***
Value Prior counsell	0.759	0.249	1.717	1.468	0.109	0.064	0.851	1242	0.628
value after counselli	1.565	0.458	1.403	1.607	0.102	0.003	1.046	0.126	1.163

***** Significant at 0.5% level.** **** Significant at 1% level.**

Table 5 -Mean Fat Intake (Grams) by the Diabetic Subjects, prior and after counselling.
Stratum – I

Fat(gms)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counsellin	88.7	71.4	54.4	59.1	38.9	35.0	60.66	55.2	57.9
SE values	±3.16	±2.31	±2.68	±3.63	±3.42	±2.37	±3.59	±2.78	±2.27
% RDA	591.33	476.00	272.00	295.55	155.66	14.00	303.00	276.00	289.55
After Counsellin	21.2	20.1	23.1	23.5	26.8	27.7	23.6	23.7	23.6
+-SE values	±2.13	±1.76	±1.65	±1.65	±2.61	±2,70	±1.54	±1.19	±0.99
% RDA	141.33	134.00	115.55	117.55	107.22	110.88	118.00	118.55	118.00
T Value	10.64***	12.10***	5.78***	5.68***	3.17***	3.86***	6.45***	5.54***	8.27***

Stratum-II

Fat(gms)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counsellin	78.7	77.3	61.8	55.8	39.1	35.0	59.9	56.1	58.0
SE values	±2.07	±2.37	±3.08	±1.22	±2.81	±2.34	±2.87	±2.84	±2.02
% RDA	524.66	515.33	309.00	279.00	156.44	140.00	299.55	280.55	290.00
After Counsellin	20.8	20.4	23.2	22.3	28.2	26.8	24.0	23.1	23.6
+-SE values	±1.61	±1.63	±1.39	±0.91	±2.00	±1.49	±1.15	±0.86	±0.87
% RDA	138.00	136.00	116.00	111.55	112.88	107.22	120.00	115.55	118.00
T Value	12.72***	10.54***	5.67***	13.36***	1.26*	2.35**	5.85***	8.05***	9.54***
F Value Prior counselling	0.905	1.234	1.326	0.747	0.004	0.101	0.159	0.224	0.025
F value after counselling	0.004	0.068	0.047	1.336	1.817	0.359	1.276	0.177	0.288

*****Significant at 0.5% level** ****Significant at 1% level** ***Significant at 5% level**

Table 6: Mean Fiber intake in Grams by the subjects prior and after counselling
Stratum I

Fiber(gm)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
rior counsellir	10.2	9.8	10.7	9.7	10.1	9.3	10.3	9.6	10.0
±SE Values	±0.86	±0.87	±0.96	±0.80	±0.73	±0.68	±0.48	±0.44	±0.33
% RDA	29.11	28.00	30.55	27.77	28.88	26.55	29.44	27.44	28.55
fter Counselli	34.4	30.4	35.1	35.2	31.7	31.3	33.7	32.3	33.0
±SE Values	±0.94	±0.96	±1.14	±1.10	±1.01	±0.87	±0.62	±0.61	±0.43
% RDA	98.22	86.85	100.22	100.55	90.55	89.44	96.22	92.28	94.22

T Value	12.08***	13.96***	11.48***	19.75***	14.41***	19.18***	19.84***	21.91***	23.72***

Stratum - II

Fiber(gm)	Obese		Normal Weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Prior counselling	11.1	10.8	11.4	10.5	9.8	10.2	10.8	10.5	10.6
±SE Values	±0.84	±1.09	±0.77	±0.67	±0.62	±0.69	±0.43	±0.47	±0.32
% RDA	31.77	30.88	32.55	30.00	28.00	29.11	30.88	30.00	30.22
After Counselling	35.7	33.2	35.9	35.9	28.9	27.6	33.5	32.3	32.8
±SE Values	±0.71	±0.94	±1.09	±0.99	±1.15	±0.90	±0.62	±0.57	±0.42
% RDA	102.00	94.88	102.55	102.55	82.55	78.88	95.11	92.22	93.77
T Value	21.50***	25.66***	28.42***	11.34***	11.69***	12.39***	19.82***	28.50***	7.47***
Value prior counsell	0.555	0.482	0.303	0.575	0.076	0.933	0.670	1.381	1.457
Value after counsell	1.400	1.106	0.773	0.045	0.303	1.177	1.374	1.589	1.102

***-Significant at 0.5% level

