

Correlation between nutrient intake with BMI in diabetic subjects

*Archana Singh and Nirmal

Department of food & Nutrition (Biochemistry),
 Institute of Home Science,
 Dr.B.R.Ambedkar University, AGRA (U.P.)
 *Corresponding Author
 Email.Id: 301archana @gmail.com

Received : 15.03.2019; **Accepted :** 10.05.2019**ABSTRACT**

Diabetes mellitus represents a cluster of metabolic diseases characterized by high level of blood glucose (Hyperglycaemia). People are at greater risk of diabetes due to improper dietary practice, unhealthy life style, lack of physical exercise. Multistage stratified sampling technique was used for selecting 50 samples and an interview schedule was evolved to collect information regarding socio-economic profile, dietary pattern, etc The present study was conducted to assess the health status through BMI in diabetic patients aged between 30- 50 years (All subjects had Type-2 diabetes) and correlate between BMI with age and nutrient intake in diabetic subjects. As per result obtained, positive and insignificant correlations were observed between BMI with nutrient intake with age in the present study. ($p>0.05$).

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KEY WORDS : Body Mass Index, Diabetes mellitus, Fasting Glucose.

Introduction

Diabetes is associated with considerable morbidity and mortality of the elderly and is the most prevalent metabolic disease and is one of the significant medical and socio-economic problems all over the world. Type 2 diabetes (DM2) has become a leading public health issue globally, with estimated 366 million people affected³.

Observational studies addressing physical activity, weight loss and dietary intake of whole grains and fiber etc., provided evidences for factor that might delay or prevent Type-2 diabetes¹⁰. Indians are highly susceptible to diabetes with modest overweight, obesity and decrease in physical activity. The incidence and prevalence of diabetes in India is increasing and is a result of dietary

TABLE-1 : Distribution of the male and female respondents according to body mass index

Body Mass Index(Kg/m ²)	Sex of the respondents				Total	
	Male		Female			
	No.	%	No.	%	No.	%
15-20(normal)	04	16.00	01	4.00	5	10.0
20-25(overweight)	14	56.00	11	44.00	25	50.0
25 and above(obese)	7	28.00	13	52.00	20	40.0
Total	25	50.00	25	50.00	50	100.0
Mean	22.84		23.51		23.18	
SD	3.77		5.21		4.56	
t-test	0.521					
p	>0.05					

TABLE- 2 : Mean nutrients intake among the diabetic subjects

Nutrient	Unit	Statistical Values	
		Mean	SD
Calories	Kcal	1971.48	110.81
Protein	g	62.26	1.60
Calcium	mg	612.74	63.22
Vitamin A	µg	289.90	145.36
Vitamin B ₁	mg	1.14	0.08
Vitamin C	mg	38.98	14.11
Iron	mg	26.10	2.40
Fat	g	30.45	1.75
Riboflavin	mg	1.11	0.11
Niacin	mg	13.34	1.50

habits and life style. In adults the prevalence of diabetes is 2-3 folds greater in urban than in rural population^{1,7}. A sedentary life style is damaging to health and bears responsibility for the growing obesity problems. As BMI increases, insulin resistance also increases which results in increased blood glucose level.⁶ Since body weight is associated with BMI, it may be expected that BMI should correlate with blood glucose levels. Unhealthy food, irregular exercise and changes in life style and increased age are the main cause of diabetes^{5,8}. As per result obtained positive and significant statistical correlation between mean nutrient intake and Body Mass Index (BMI) the aim of this study is to evaluate the correlation between BMI and mean nutrient intake with age, in type 2 diabetes subjects.

Material and Methods

The study was carried out in 50 diabetic male and female diabetic subjects from local hospitals from Agra city. Multistage stratified random sampling technique was used in the selection of samples. In this study, relevant information regarding socio-economic profile, dietary pattern, Yoga *etc.* From the patients the predesigned schedules was collected. The study was carried out under the following objectives:

1. To assess the health status through BMI in diabetic patients aged between 30- 50 years (All subjects had Type-2 diabetes)

2. To correlate the nutrient intake with BMI in diabetic subjects.

FBG measurement was done in morning after 12 hour fast and postprandial blood glucose using laboratory kits. A fasting blood sugar level above 126 mg/dl was confirmed as diabetic². Weight was recorded. Height was measured in standard standing position without shoes by using a tape meter, while keeping shoulders in erect position. Body mass index (BMI) was calculated by the formula weight (kg) divided by height squared (meter). Dietary survey was carried out by interviewing the subjects. The subjects were asked to report the consumption of cooked food which ever they took in part 3 consecutive days. To assess the dietary intake a 24 hrs recall method was used. These measures were recorded in standard volumetric measures and later converted to raw weight to food in gram and the nutritive value was calculated using the food as per recommendation by ICMR (2010). Statistical analysis was performed to find out the effect of all factors on diabetes and the Cross tabulation was used to perform statistical calculation using SPSS. P value less than 0.05 was considered significant. The data were expressed as mean \pm SD

Result and Discussion

Results of our study are summarized below:

A- Assessment of BMI through anthropometric

TABLE-3 : Correlation between ages with various nutrient intakes among male diabetic patients.

Parameters	Unit	Statistical Values				
		Mean	SD	r	t	p
Age	Year	49.96	11.66			
Calories	Kcal	1971.48	110.81	-0.190	1.341	>0.05
Protein	g	62.26	1.60	-0.50	0.347	>0.05
Calcium	mg	612.74	63.22	+0.381	2.855	<0.05
Vitamin A	µg	289.90	145.36	+0.215	1.525	>0.05
Vitamin B ₁	mg	1.14	0.08	-0.231	1.695	>0.05
Vitamin C	mg	38.98	14.11	+0.085	0.591	>0.05
Iron	mg	26.10	2.40	+0.433	3.328	<0.05
Fat	g	30.45	1.75	+0.313	2.283	<0.05
Riboflavin	mg	1.11	0.11	+0.253	1.812	>0.05
Niacin	mg	13.34	1.50	+0.507	4.075	<0.05

measurement of the selected diabetic subjects

Out of the 50 male and female diabetic patients, majority of them (50.00%) were having the body mass index of 20 – 25 kg., followed by 40.00% having the body mass index of 25 and above and the minimum (10.00%) were having the body mass index of 15-20. Out of the 50 male diabetic patients, majority of them (56.00%) were having the body mass index of 20 – 25 kg., followed by 28.0% having the body mass index of 25 and above and the minimum (16.00%) were having the body mass index of 15-20. Out of the 50 female diabetic patients, majority of them (52.00%) had the body mass index of 25 and above followed by 44.0% having the body mass index of 20 – 25 kg and the minimum (4.0%) had the body mass index of 15-20. Further analysis of data from the Table show that the mean of BMI of the diabetic patients was 23.18 of which were more among the female diabetic patients (23.51) as compared to male diabetic patients (22.84).^{4,9}

B- Correlation between nutrient intakes with BMI in diabetic subjects.

Table-3 reveals the mean intake of various nutrients according to sex. Mean intake of diabetic patients in respect of calories, proteins, calcium, Vitamin A, vitamin B₁, Vitamin C, fat, iron riboflavin and niacin were found to

be 1971.48kcal, 62.26g, 612.74mg, 289.90 µg, 1.14mg,38.98mg,26.10mg, 30.45g,1.11mg and 13.34 mg respectively in the present study⁹.

Table-4 reveals the correlation between nutrient intakes with age of the diabetic patients. Positive and significant correlations were observed between nutrient intake of calcium, iron, fat and niacin with age of the diabetic patients ($p < 0.05$), that is as the nutrient intake of calcium, iron, fat and niacin increases, the age of the diabetic patients also increases and vice-versa. While positive and insignificant correlations were observed between nutrient intake of vitamin A, Vitamin C, and riboflavin with age of the diabetic patients even at 5% level of significance. However, negative and insignificant correlations were observed between nutrient intake of calories, protein, and vitamin B₁ with age of the diabetic patients even at 5% level of significance.

Table-4 reveals the correlation between nutrient intakes with body mass index of the diabetic subjects. Positive and significant correlations were observed between nutrient intake of calories, protein, calcium, iron, fat and niacin with body mass index of the diabetic patients ($p < 0.05$) that is with the nutrient intake of calories protein, calcium, iron, fat and niacin increased, the body mass index of the diabetic patients increased and vice-

TABLE-4 : Correlation between nutrient intakes with BMI of diabetic patients.

Parameters	Unit	Statistical Values				
		Mean	SD	r	t	p
BMI	Year	23.18	4.56			
Calories	Kcal	1971.48	110.81	+0.298	2.163	<0.05
Protein	g	62.26	1.60	+0.307	2.181	<0.05
Calcium	mg	612.74	63.22	+0.316	2.308	<0.05
Vitamin A	µg	289.90	145.36	+0.080	0.556	>0.05
Vitamin B ₁	mg	1.14	0.08	+0.071	0.493	>0.05
Vitamin C	mg	38.98	14.11	+0.126	0.880	>0.05
Iron	mg	26.10	2.40	+0.375	2.803	<0.05
Fat	g	30.45	1.75	+0.313	2.283	<0.05
Riboflavin	mg	1.11	0.11	-0.270	1.943	>0.05
Niacin	mg	13.34	1.50	+0.448	3.472	<0.05

versa. While positive and insignificant correlations were observed between nutrient intake of Vitamin A, Vitamin B₁ and Vitamin C, with Body mass index of the diabetic patients even at 5% level of significance ($p < 0.05$). However, negative and insignificant correlations were observed between nutrient intake of riboflavin with Body mass index of the diabetic patients even at 5% level of significance ($p < 0.05$)

Conclusion

From the study we found positive and significant

correlations between the age with nutrient intake *i.e.* Calcium, iron, fat and niacin. While positive and insignificant correlations were observed between nutrient intake of vitamin A, Vitamin C and riboflavin with age of the diabetic patients even at 5% level of significance. It may be due to poor nutritional status, poor diet and lack of exercise *etc.* From the above observations, it can be concluded that regular exercise may prevent new-onset of Type 2-diabetes, especially in patients with high BMI. Thus, alongwith other forms of treatment, mild regular exercise played an important role in primary prevention of other complications alongwith diabetes.

References

1. Agardh E, Allebeckp, Hallqvist J. Type 2 diabetes incidence and socioeconomic position : a systemic review and meta. *Analysis. int. J. Epidemiol* 2011; **40**93 : 804-18
2. Bakari AG, Onygemelukwe GC, Sani BG, Aliyu IS, Hassan SS, Aliyu TM. Relationship between random blood sugar and body mass index in an african population. *Int J. Diabetes Metab.* 2006; **14** :144–5.
3. Boule NG, Haddad E, Kenny GP. Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: A meta analysis of controlled clinical trials, *Jama.* 2001; **286** (10) : 1218-27.
4. Emerging Risk Factors Collaboration. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease. *A collaborative meta-analysis of 102 prospective studies.* 2010; **375** (9733) : 2215–2222
5. Iris Shai, Jiang Rui, Joann E Manson, Meir J Stampfer, Walter C Willett, Graham A Colditz, Frank B Hu. Ethnicity, obesity, and risk of type 2 diabetes in women. *Diabetes Care jul.* 2006 ; **29**(7): 1585-1590.

6. Neelam Agrawall, Mukesh Kumar Agrawal , Tannu Kumari , Sunil Kumar. Correlation between body mass index and blood glucose levels in Jharkhand population. *International Journal of contemporary medical research*; 2017; **4**(8) : 1633-1636.
7. Sigal RJ, Kenny GP, Wasserman DH, Castaneda Sceppa C, White RD. Physical activity / exercise and type 2 diabetes. A consensus statement from the American Diabetes Association, *Diabetic care*. 2006; **29** : 1433-1438(5).
8. Simin Liu, MD, Hyon K. Choi, Earl Ford, Yiqing Song, Anna Klevak, Julie E Buring, Joann E Manson. A prospective study of dairy intake and the risk of type 2 diabetes in women. *Diabetes care Jul*. 2006; **29** (7) : 1579-1584
9. Singh Archana. Study to correlate the nutritional status among male and female diabetic patients. *Flora and Fauna*. 2015; **21** (1) : 14-17.
10. Weinstein AR, Sesso HD, Lee IM, Cook NR, Manson JE, Buring JE, Gaziano JM. Relationship of physical activity vs body mass index with type 2 diabetes in women. *Jama*. 2004 ; **292** (10) : 1188-94.