

**NUTRITIONAL STATUS AND NUTRITION**  
**KNOWLEDGE AMONG DIABETICS IN RURAL**  
**POPULATION IN MANGALORE TALUK**

**Jeena John \***

**Geetha Santhosh \*\***

---

---

**Abstract**

Diabetes mellitus, a chronic metabolic disorder is due to decreased ability or total inability of the tissues to utilize carbohydrates. It has affected more than 50 million people in India and its prevalence is increasing in both urban and rural areas. Rural population is primarily exposed to diabetes because of the lack of screening facility at Primary Health Care level. The need of the study was to promote overall health of the rural population by assessing the prevalence of diabetes mellitus, their nutrition status and nutrition knowledge. A cross sectional study using random sampling technique with a sample of 120 patients was employed in rural population setting at three Community Health Care centres in Mangaluru Taluk. A pre designed interview

---

***Keywords:***

Diabetes mellitus;  
Rural population;  
Nutrition screening;  
Primary health care centre;  
Nutrition awareness.

---

**\* Department of Nutrition and Dietetics, Mount Carmel College, Bengaluru**

**\*\*Assistant Professor, Department of Nutrition and Dietetics, Mount Carmel College, Bengaluru**

---

schedule was administered to the participants to elicit information. 51% of the study population had diabetes. Based on IDRS (Indian Diabetic Risk Score) method, 36% of the non diabetic population was at high risk of developing diabetes. Majority of confirmed population were well nourished with mean BMI of  $24.81 \pm 4.27$  kg/m<sup>2</sup>. Waist circumference had a significant association with weight on diabetes ( $r = 0.6116$  and  $p < 1\%$ ) when compared to other factors of anthropometric measurements. About 61% of the non diabetic population and 48% of the diabetic population had moderate level of nutrition knowledge. It was seen that diabetic (62%) and non diabetic (51%) population were aware of the myths and facts about diabetes. A strong association was seen between nutrition knowledge level and socio economic status of the study population. Practice had negative correlation with knowledge at 5% significance level whereas a positive correlation was seen with attitude at 1% significance level. In conclusion, the present study contributes to the understanding of the growing prevalence of diabetes in rural area and the need to develop supportive interventions to address the quality of lifestyle issues and promote nutrition awareness among them.

---

---

---

## **1. Introduction**

Ever since its discovery, diabetes has been the fastest growing non communicable disease and the most common metabolic disorder in this industrialized world prevalent across the globe. Undiagnosed and uncontrolled diabetes has caused a serious threat contributing to the huge burden. Poor healthcare infrastructure, lack of awareness has further added to the long term

complication especially in backward areas where many cases remain uncontrolled or even undiagnosed till complications develop (**Wild *et al*, 2004**). Globally 46.3% diabetics remain unaware of their diabetic status and in India alone, the estimated number is 35.5 million and can be even higher because of the lack of proper access to the health care facilities (**Kanungo *et al.*, 2016**).

According to **American Diabetes Association, 2004** the goal of nutrition should be to attain and maintain the optimal metabolic outcome including blood glucose level, blood pressure and lipid profile, to prevent and treat the complication by modifying the nutrient intake and lifestyle, improve health by right food choice and by physical activity habits that reduce insulin resistance and improve metabolic status etc.

In a recent study, as per the Indian Diabetes Risk Score (IDRS), subjects who were at risks of diabetes was nearly one third of the rural population was under risk of developing diabetes mellitus (**Poornima *et al.*, 2016**). Thus, early identification of the disease and taking appropriate intervention will help in the prevention and burden of the disease. The aim of the present study is to promote overall health of the rural population by assessing the prevalence of diabetes mellitus, their nutrition status and nutrition knowledge.

## **2. Research Method**

A cross sectional study was done among 120 patients by using random sampling technique. The subjects were selected from three rural primary health care centres in Mangalore Taluk. The data was collected by a pre designed questionnaire administered in local language.

### **STUDY PROCEDURE**

Permission was obtained from the District Medical Health Officer (DHO), Mangaluru and the medical officer in-charge of the respective Primary / Community Health Care Centre to conduct the study. The consent was also taken from the respondents prior to participation in the study.

## DATA COLLECTION

The purpose and the process of the study were explained to the study subjects. Predesigned interview schedule was administered to the study population to elicit information on various aspects of the study. On screening, subjects were selected as per the defined inclusion and exclusion criteria with confirmed diagnosis of diabetes being enrolled in the study.

## ANTHROPOMETRIC ASSESSMENT

Height and weight of the confirmed diabetic study subjects were measured. BMI was estimated as per WHO classification (2004)

<b>INTERNATIONAL CLASSIFICATION OF BMI</b>	
Underweight	<18.49 kg/m <sup>2</sup>
Normal	18.50 – 24.99 kg/ m <sup>2</sup>
Overweight	>25kg/ m <sup>2</sup>
Pre obese	25 – 29.99kg/ m <sup>2</sup>
Obese class I	30 – 34.99kg/ m <sup>2</sup>
Obese class II	35 – 39.99kg/ m <sup>2</sup>
Obese class III	>40kg/ m <sup>2</sup>

Waist circumference of the study subjects was measured. Waist circumference was defined as the smallest girth between the costal margin and iliac crests measurement. Waist to height ratio was calculated to know the body fat distribution. Higher the ratio value greater is the risks of developing complications of diabetes. Previous studies reported that apple / android type mostly seen in men whereas pear / gynoid are seen in women.

Biochemical and clinical parameters such as random blood sugar level and blood pressure were measured in the NCD centre. Blood samples were drawn from patients and sent to KMC hospital, Mangaluru for detailed analysis. Notable signs and symptoms such as hyperglycaemia, polyuria, nocturia, dehydration, hypertension, fatigue, weight loss, polydipsia duration of diabetes and family history were recorded.

Food Frequency Questionnaire was used to elicit information on consumption of foods. Knowledge, attitude and practice of the study participant were assessed on a series of questions on diabetes mellitus. It also included myths and facts on diabetes. Information on awareness of diabetes, personal experience of the condition like their feelings, attitudes and concerns towards the disease was elicited. The nutrition education programme was developed to increase the awareness of the study population about nutrition care and management of diabetes.

### STATISTICAL ANALYSIS

Based on the criteria of the study, compiled data was analyzed, results interpreted with appropriate statistical measures viz Mean, percentage, standard deviation.

### 3. Results and Analysis

Information on socio demographic data, diabetes prevalence, nutrition status and nutrition knowledge among diabetics in rural population in Mangalore Taluk was elicited. **Table 1** represents respondent distribution of age and socio-economic status on the basis of gender. Majority of the study subjects (35% male, 29% female) belonged to the age group of 50 – 60 years while a small percentage (15% male, 9% female) belonged to the age group 70 years and above. Least number of participants (6% female) belonged to the age group of below 30 years. As per the Socio economic status (**Kuppuswamy, 2015**), 35% and 9% of the population belonged to lower income and upper middle income group respectively. None of the study subjects belonged to Upper class of socioeconomic group.

**Table 2** shows that, about 51% of the total study population reported to suffer from diabetes whereas 49% were unaffected from the disease. Rural population remains exposed to high level of blood sugar for long time due to lack of screening facility of diabetes at Primary Health Care level, and this increases the chance of developing various complication of diabetes mellitus (**Madaan et al, 2014**). Indian Diabetic Risk Score was used to identify the risk for developing diabetes mellitus among non diabetic study population (**Mohan et al, 2005**). 36% of the study population was at high risk of developing type 2 diabetes. (**Table 3**)

After screening, sixty one confirmed cases of diabetes were further evaluated for their nutrition status, knowledge attitude and practice. Anthropometric measurements of the respondents are depicted in **Table 4**. The mean height was 153.81cms  $\pm$  6.45 and the mean weight was 58.72kgs  $\pm$ 9.69. Majority of the diabetic population were well nourished with mean BMI of 24.81 $\pm$ 4.27. The mean for waist to height ratio for the study population was 0.58 $\pm$ 0.07 (**Hajian et al, 2015**). As depicted in **Table 5**, more than 50% of the respondents had right knowledge related to diabetes such as danger signs of diabetes, family history, stress, effect on blood circulation, illness, diet and physical activity (**Maskari et al, 2013**). Stress is one of the factors in the development of diabetes. Positive attitude towards life is very important for a better diabetic care. But sometimes there can arise a negative attitude that can affect the diabetic management. In this context, it was concluded that majority of the population had positive attitude towards family support, decisions and outlook of life. It was interesting to note that 59-62% of the study population had a positive attitude towards the blood sugar level control. Respondents understood the need to control blood sugar level to prevent or delay the onset of complications such as nerve damage, delayed wound healing, eye problem, kidney problems and other health conditions. About 62-81% of the population agreed the need of controlled diet and modification with regular exercise for management of diabetes.

**Table 7** showed that about 48-59% of the population were irregular in management of diabetes; their visit to doctors did not show any major difference. Diet is an important factor in the management of diabetes. Skipping a meal and eating lots of sweets and carbohydrate foods can have a negative effect in the blood glucose level. 41-49% of the population followed the prescribed diet regularly and included good amount of fibre in the diet. Diet and medication both are necessary in the management of diabetes. But a negative regularity owing to lack of time was seen in the population.

#### **4. Conclusion**

In the present study, it was further proven that diabetes is a serious and complex condition even in rural population. The prevalence of diabetes in the study population was 51% with associated risk factor. There is lack of awareness of the condition especially among the rural population. Many of them are not screened for diabetes owing to the lack of knowledge and finance. IDRS is

the best and cost effective screening method to find the risk of diabetes at the earliest and prevent the disease condition. In this study, even though overweight and obesity are small in number it should be taken into consideration as Indians have shown an increased risk of diabetes and other ill health condition.

There is a need to create awareness both in general and diabetic population to decrease the incidence and reduce other co-morbid condition. In fact it was seen that many of them were frustrated about their condition which in turn increased their risk of depression and anxiety disorder. With change in attitude and practice towards the disease, treatment to prevent illness and health promotion, diabetes mellitus is a condition where early recognition and intervention can help prevent or delay the onset of disease and complications.

### **ACKNOWLEDGEMENT**

We would like to thank Dr. Sydney D'Souza, Professor of A. J Institute of Medical Science, Mangalore doctors, Non Communicable Disease staffs of Bajpe Primary Health Care Centre, Katipalla Primary Health Care Centre and Mulki Community Health Care Centre in Mangalore for facilitating the study.

### **References**

1. Al-Maskari, F., El-Sadig, M., Al-Kaabi, J. M., Afandi, B., Nagelkerke, N., & Yeatts, K. B. (2013). Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PloS one*, 8(1), e52857.
2. American Diabetes Association. (2004). Diagnosis and classification of diabetes mellitus. *Diabetes care*, 27(suppl 1), s5-s10.
3. Gadhav, S., & Nagarkar, A. (2015). Kuppusswamy Scale for measuring socio-economic status: Revised monthly income figures for 2015. *The Indian Journal of Pediatrics*, 82(12), 1175-1176.
4. Hajian-Tilaki, K., & Heidari, B. (2015). Is waist circumference a better predictor of diabetes than body mass index or waist-to-height ratio in Iranian adults?. *International journal of preventive medicine*, 6.

5. Kanungo, S., Mahapatra, T., Bhowmik, K., Mahapatra, S., Saha, J., Pal, D., & Sarkar, K. (2016). Diabetes scenario in a backward rural district population of India and need for restructuring of health care delivery services. *Epidemiol*, 6, 224.
6. Madaan, H., Agrawal, P., Garg, R., Sachdeva, A., Partra, S. K., & Nair, R. (2014). Prevalence of diabetes mellitus in rural population of district Sonapat, India.
7. Mohan, V., Deepa, R., Deepa, M., Somannavar, S., & Datta, M. (2005). A simplified Indian Diabetes Risk Score for screening for undiagnosed diabetic subjects. *The Journal of the Association of Physicians of India*, 53, 759-63.
8. Poornima, M. P., Walvekar, P. R., Mallapur, M. D., & Katti, S. M. (2016). Assessment of Susceptibility to Diabetes Mellitus among Rural Population using Indian Diabetic Risk Score-a Cross Sectional Study. *International Journal of Health Sciences and Research (IJHSR)*, 6(2), 54-58.
9. Wild, S. H., Roglic, G., Green, A., Sicree, R., & King, H. (2004). Global prevalence of diabetes: estimates for the year 2000 and projections for 2030: response to Rathman and Giani. *Diabetes care*, 27(10), 2569-2569.



**TABLE 1: AGE AND SOCIO-ECONOMIC STATUS OF RESPONDENTS**

Parameters	Male (n = 40)		Female (n = 80)	
	No.	%	No.	%
<b>Age (in Yrs)</b>				
<b>Below 30</b>	-	-	5	6
<b>30 – 40</b>	4	10	16	20
<b>40 – 50</b>	8	20	15	19
<b>50 – 60</b>	14	35	23	29
<b>60 – 70</b>	8	20	14	17
<b>Above 70</b>	6	15	7	9
<b>Total</b>	40	100	80	100
<b>SES</b>				
<b>Upper middle</b>	6	15	5	6
<b>Lower middle</b>	6	15	22	27
<b>Upper low</b>	12	30	27	34
<b>Lower</b>	16	40	26	33
<b>Total</b>	40	100	80	100

**TABLE 2: Prevalence of Diabetes among Respondents**

Prevalence of Diabetes	Male		Female		Total	
	No.	%	No.	%	No.	%
<b>Diabetes</b>	28	70	33	41	61	51
<b>Non diabetes</b>	12	30	47	59	59	49
<b>Total</b>	40	100	80	100	120	100

**TABLE 3: RISK Analysis of Non Diabetes Respondents as per IDRS Score**

Level of Diabetes risk	No.	%
------------------------	-----	---

<b>Low risk (&lt; 30)</b>	12	20
<b>Medium risk (30 - 50)</b>	26	44
<b>High risk (&gt; 60)</b>	21	36
<b>Total</b>	59	100

**TABLE 4: Anthropometric Measurements**

<b>Characters</b>	<b>Mean</b>	<b>SD</b>
<b>Height (cms)</b>	153.81	6.45
<b>Weight(Kgs)</b>	58.72	9.69
<b>BMI (kg/m<sup>2</sup>)</b>	24.81	4.27
<b>Waist circumference (cms)</b>	90.79	9.72
<b>Waist to Height ratio</b>	0.58	0.07

**TABLE 5: Nutrition Knowledge among Diabetic Population**

Knowledge about Nutrition	Correct Response		Wrong Response	
	No.	%	No.	%
Danger signs such as obesity, pregnancy, old age can cause diabetes	48	79	13	21
Only people with family history need to be tested for diabetes	39	64	22	36
Stress is a major factor that causes diabetes	45	74	16	26
Diabetes will not affect blood circulation	37	61	24	39
Being ill (fever, cold) will worsen the condition of diabetes	31	51	30	49
People whose diabetes is treated by just a diet do not have to worry about getting many long-term complications (eg: damage to eye sight, nerve damage, kidney disease)	40	66	21	34
Weight management is very important in diabetes	47	77	14	23
Physical activity helps in managing diabetes	51	84	10	16
Smoking does not cause diabetes	25	41	36	59
Alcohol intake causes diabetes	28	46	33	54

**TABLE 6 : Attitude towards Diabetes**

Attitude towards Diabetes	Strongly agree		Agree		Disagree		Strongly disagree	
	No.	%	No.	%	No.	%	No.	%
Having diabetes changes a person's outlook on life	23	38	27	44	10	16	1	2
It is irritating for people with diabetes to manage their disease condition	16	26	24	39	15	25	6	10
Support from family and friends is very important in dealing with diabetes	22	36	24	39	11	18	4	7
The important decisions regarding daily diabetes care should be made by the person with diabetes	19	31	29	48	9	15	4	6
There is no need to get blood sugar level controlled because complication will occur anyway	12	20	11	18	31	51	7	11
To treat diabetes, checking blood sugar levels is not important	7	11	17	28	31	51	5	8
People who do not need to take insulin to treat their diabetes are not prone to further complications of diabetes	5	8	22	36	27	44	7	11
People with diabetes need to follow a special diet	9	15	40	66	12	20	-	-
Controlled diet and regular exercise helps in maintenance of blood glucose	16	26	22	36	20	33	3	5

**TABLE 7: Practice about Diabetes**

Practice about Diabetes	Always		Occasionally		Never	
	No.	%	No.	%	No.	%
I am always good at managing diabetes	19	31	36	59	6	10
Doctor's appointment for diabetes treatment is followed regularly	29	48	28	46	4	6
Physical activity (walking, yoga) is included as a part of daily routine to help in managing diabetes	23	38	29	48	9	15
I skip a meal or snack deliberately to cut down calorie or fat	26	43	30	49	5	8
I eat lot of sweets and carbohydrate rich foods	13	21	38	62	10	16
Diet prescribed for managing diabetes is followed regularly	27	44	30	49	4	6
Good amount of fibre is included in the diet	22	36	25	41	14	23
All the prescribed medication for the management of diabetes are taken on time	28	46	30	49	3	5
Insulin shots prescribed by the doctor for the management of diabetes is taken on time	21	34	19	31	21	34