The association between dietary intake and lifestyle pattern of diabetes patients in Manipur

ABSTRACT

The aim of the study was to examine the association between dietary intake and lifestyle pattern of diabetes patients in Manipur. Tribal and non tribal respondentsbetween 45-64 years of age randomly selected from the Regional Institute of Medical Sciences (RIMS) hospital Manipur. Total 200 study subjects 100 tribal and 100 non tribal subjects constituted the study.The Informationswere collected on socio-demographic profile, clinical,anthropometric measurements and dietary intakes of the patients by using 24-hour recall method. The data were analysed and tabulated using statistical tools such as frequency, percentage, means, standard deviation, MS Excel and Pearson's correlation test. The results have shown alcohol, triglycerides, energy, oils and sugar consumption were significantly correlated with the prevalence of diabetes. The low calcium intake among non tribal individuals reveals a significant association with FBG (Fasting Blood Glucose) test results, as quoted low calcium level increases type II diabetes. while low calcium intake among the non tribal community showed significant relation to the PP (Post Prandial) test results, i.e. increase in PP .tribal energy intake and non tribal protein intake were significantly related with HbA1c (Glycated Haemoglobin) test.

Out of which 100 tribal and 100 non tribal respondents were selected

Keywords: Diabetes, Tribal, Non tribal, Demographic profile, Lifestyle pattern and Clinical parameters.

1. INTRODUCTION

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces (WHO, 2023). Its rising incidence in emerging nations like India is directly related to ageing populations, urbanized lifestyles and population structure (Ramachandran, 2001). Approximately 422 million individuals globally suffer from diabetes, with the majority residing in low and middle-income nations. The disease is directly responsible for 1.5 million deaths annually. Over the past few decades, there has been a steady rise in both the number of cases and the incidence of diabetes (WHO, 2023). According to NFHS 2019-21 reports, India had the proportion of women who were requiring medication or having high blood glucose levels (above 140 mg/dl) varied across different religious groups: Hindus (13.3%), Muslims (13.8%), Christians (19.2%), Sikhs (14.6%), Buddhists (17.5%), Jains (9.5%), and others (10.3%). For men, the percentages were Hindus (15.5%), Muslims (15.5%), Christians (20.4%), Sikhs (14.2%), Buddhists (11.6%), Jains (17.3%), and others (13.5%) (James *et al.,* 2022). For Manipur, the percentage of women and men with blood glucose levels higher than 140 mg/dl or taking medicine to lower their blood glucose level were 13.6% and 16.5% respectively. This rate for women and men for schedule tribe accounts 6.4% and 9.9% respectively (Lhungdim*et al.,*2021).

Genetic and environmental variables, such as family history, older age, obesity, and physical inactivity, are risk factors for this condition. Long-term obesity and a sedentary lifestyle may have an impact on the likelihood of developing type 2 diabetes Bakr *et al.,* (2015). Delay in the onset of T2DM can be made by the use of healthy diet, having regular physical activity, and also through the avoidance of tobacco (WHO, 2023). T2DM and its complications constitute a major public health problem worldwide, affecting almost all populations in both developed and developing countries, with high rates of diabetes-related morbidity and mortality (Wu *et al.,* 2014).

2. MATERIAL AND METHODS

2.1 Study Area and Selection of Respondents

This cross-sectional study was carried out in the Manipur NCD (Non Communicable Disease) unit of RIMS Hospital. Patients with diabetes from the non-tribal Meiteis group as well as the tribal Nagas and Kukis group were chosen. The required sample sizes were selected from the hospital randomly. Total 200 study sample were selected. Out of which 100 tribal and 100 non tribal respondents were selected. Fifty from each gender. The chosen age range falls into late middle age (45–64 years old).

2.2 Methods of Data Collection

The main instruments used in the study were pre-tested and pre-designed interview schedules. Utilizing the 24-hour recall method, Informations were gathered on the patients' nutritional intakes, anthropometric measurements, clinical data, and sociodemographic profile. In anthropometric measurements are weight, height, and waist-hip ratio were taken. The formula kg/m^2, where m^2 is the square of a person's height in meters, is used to calculate a person's BMI (Body Mass Index). Utilizing the WHO classification, the BMI was evaluated. Measurements of height, weight were obtained using a digital scale. The patients' height was determined using an anthropometer rod.Updated blood glucose monitoring and cholesterol levels records were taken from the patients.

2.3 Statistical Analysis

The data were analysed and tabulated using statistical tools such as frequency, percentage, means, standard deviation, MS Excel and Pearson’s correlation test.

3. Results and Discussion:

Table shows the association between the dietary intake and lifestyle pattern of diabetes patients in Manipur which describe thoroughly about demographic factors like age, occupation, qualification, marital status, total annual income and addiction pattern.Tables 1 show the demographic factors of the diabetic patients from tribal and non tribal communities. A majority from both groups falls within the age group of 55-64 and annual income falls under 2 lakhs per annum. Service was the main occupation for male and majority of females were under housewives category. Male under service category and female under housewife category in both communities exhibited a higher prevalence of diabetes. Respondents who got higher education had more incidence of diabetes in both tribal and non tribal communities. Probably, the reason behind this is highly paid services because of good education level. More than 90% of the respondents were married. Among the surveyed population, tribal males (68%) exhibited the highest alcohol consumption as compared to others. Tobacco uses was prevalent among tribal males 70% and tribal females at 66%. In comparison non tribal males reported a lower tobacco usage at 50%, while non tribal females had the highest rate at 72%. A similar study conducted by Jayawardena *et al.,* (2014) and Wimmer *et al.,* (2023) revealed that old aged people and individuals with higher income were more prevalent to diabetes. A study conducted by Begum *et al.* (2004) found that housewives were more diabetic than others. A study by Kim *et al.,* (2021) noticed that more than 50% male diabetic patients used tobacco and consumed alcohol. According to Onalan and Gozel (2020), smoking cigarettes raises the incidence of diabetes.

Table 1. Distribution of study subjects based on socio-demographic details:
N= (Tribal=100, Non tribal=100), (Male=50, Female=50)

Demographic factors	Tribal F (%)		Non tribal F (%)	
1. Age Group	**Male**	**Female**	**Male**	**Female**
45-54	14 (28)	18 (36)	15 (30)	16 (32)
55-64	36 (72)	32 (64)	35 (70)	34 (68)

2. Occupation				
Housewife	-	22 (44)	-	28 (56)
Farmer	9 (18)	1 (2)	12 (24)	-
Wage earner	1 (2)	3 (6)	4 (8)	2 (4)
Service	29 (58)	13 (26)	22 (44)	11 (22)
Business	11 (22)	11 (22)	12 (24)	9 (18)
3. Qualification				
Illiterate	2 (4)	2 (4)	3 (6)	6 (12)
Can read & write	1 (2)	3 (6)	4 (8)	2 (4)
Middle School	4 (8)	8 (16)	4 (8)	6 (12)
High School	10 (20)	10 (20)	7 (14)	15 (30)
Higher Secondary	14 (28)	11 (22)	13 (26)	7 (14)
Under graduate	15 (30)	16 (32)	15 (30)	12 (24)
Post graduate	4 (8)	-	4 (8)	2 (4)
4. Marital status				
Married	43 (86)	32 (64)	49 (98)	37 (74)
Unmarried	2 (4)	3 (6)	-	1 (2)
Widow	-	15 (30)	-	12 (24)
Widower	5 (10)	-	1 (2)	-
5. Total annual income of family (in rupees)				
<50,000	-	-	1 (2)	1 (2)
50,001 – 1,00,000	2 (4)	4 (8)	-	5 (10)
1,00,001 – 1,50,000	1 (2)	2 (4)	5 (10)	5 (10)
1,50,001 – 2,00,000	3 (6)	2 (4)	3 (6)	8 (16)
>2,00,000	44 (88)	42 (84)	41 (82)	31 (62)
6. Addiction Pattern				
Alcohol				
Yes	34 (68)	8 (16)	16 (32)	-
No	16 (32)	42 (84)	34 (68)	50 (100)
Tobacco				
Yes	35 (70)	33 (66)	25 (50)	36 (72)
No	15 (30)	17 (34)	25(50)	14 (28)

F= Frequency

Table 2 represents the association of demographic profile, lifestyle pattern and clinical parameters. The mean of tribal and non tribal population were compared height, weight, BMI, increased alcohol intake and higher triglyceride levels showed significance positive correlation among both tribal and non tribal population by using Pearson's correlation test. Additionally, nutrient such as mean energy intake, mean carbohydrate intake and mean protein (high) intake, exhibited significant results for both the communities. Moreover, the consumption of specific food categories such as cereals and millets, oils (excess) and sugar also demonstrated significant relationship across both demographic groups. The age groups of 50-69 years were significant for high chances of being diabetic as stated in a study conducted by Mathur *et al.,* (2022). In similar findings, high BMI (Motovu*et al.,* 2017) and high triglyceride levels (Jayakumari*et al.,* 2020) are significantly correlated with the prevalence of diabetes. Likewise, discovered that over consumption of alcohol (Kim *et al.,* 2021), over intake of energy (Zujko*et al.,* 2020) and protein (Shahar *et al.,* 2005) were significantly correlated with the occurrence of diabetes. Similary to the above finding (Sowmya *et al.,* 2016) revealed that excess refined cereal intake were significant with increased in diabetes. Bowen *et al.,* (2011) and Verma *et al.,* (2019) stated that excessive consumption of oils and occurrence rate of diabetes were significant.

Table 2. Profiling of study subjects based on demographic, lifestyle, and clinical parameters: N= (Tribal=100, Non tribal=100), (Male=50, Female=50)

Variables	Tribal Diabetic (Mean ± SD)	Non tribal Diabetic (Mean ± SD)	*p*-value
Age	56.48 ± 5.40	57.2 ± 5.98	**0.02***

Weight (Kg)	65.23 ± 8.46	64.3 ± 10.14	**0.00***
Height (cm)	159.01 ± 9.14	167.45 ± 7.78	**0.02***
BMI (kg/m^2)	25.40 ± 3.58	25.43 ± 4.61	**0.03***
WHtR	1.02 ± 0.07	1.03 ± 0.07	0.29
Tobacco Consumption	1.32 ± 0.46	1.39 ± 0.49	0.27
Alcohol Consumption	1.58 ± 0.49	1.84 ± 0.36	**0.01***
FBG	181.47 ± 47.26	164.45 ± 31.77	0.58
PP	260.46 ± 77.71	283.63 ± 81.87	0.55
HbA1c	9.39 ± 2.45	8.40 ± 1.86	0.96
Triglyceride (TG)	188.98 ± 74.79	156.24 ± 93.75	**0.04***
Total Cholesterol (TC)	221.89 ± 73.43	185.64 ± 48.75	0.55
LDL	102.21 ± 37.32	93.40 ± 34.71	0.65
HDL	43.15 ± 10.65	50.33 ± 17.71	0.98
Energy (kcal)	2090.39 ± 411.02	2109.52 ± 458.14	**0.00***
Carbohydrate (g/d)	262.31 ± 58.68	259.58 ± 73.82	**0.00***
Protein (g/d)	95.39 ± 26.90	70.10 ± 18.35	**0.04***
Total Fat (g/d)	75.06 ± 25.22	87.13 ± 29.51	0.34
Dietary Fibre (mg/d)	24.32 ± 7.10	23.83 ± 6.88	0.85
Cereals & Millets (g/d)	237.1 ± 64.98	226.7 ± 78.16	**0.00***
Pulses & legumes (g/d)	15.3 ± 18.17	25 ± 23.67	0.86
Fruits and vegetables (g/d)	435.44 ± 132.86	325.89 ± 114.39	0.85
Dairy products (g/d)	140.56 ± 93.58	134.3 ± 100.00	0.10
Fish, egg and meats (g/d)	278.93 ± 135.26	138.95 ± 87.30	0.32
Oils (ml/d)	43.78 ± 20.98	19.49 ± 24.88	**0.03***
Sugar (g/d)	6.17 ± 2.15	6.22 ± 2.64	**0.03***

*Significant at the 0.05 level

BMI=Body Mass Index, WHtR=Waist Hip Ratio, FBG=Fasting Blood Glucose, PP=Post Prandial, HbA1c=Glycated Haemoglobin, LDL=Low Density Lipoprotein and HDL=High Density Lipoprotein.

Table 3 demonstrates about the comparison between nutrients intake of both communities with respect to blood glucose monitoring (FBG, PP and HbA1c) and showed significant results in terms of energy, protein and calcium between them. The energy intake and lower calcium intake among non tribal individuals demonstrate a significant association with FBG test results. Among all nutrients only calcium intake among non tribal community shows significant effect on the PP test results. Further, energy intake of tribal and protein intake non tribal communities exhibited significant relationship with HbA1c test result. Similarly, (Ha *et al.,* 2019) and (Alami *et al.,* 2022) concludes that high energy intake is directly proportionate to increase in FPG test result. Another study conducted by Takeda *et al.,* (2021) and Kang and Kim (2012) also reported significant between high HbA1c levels and energy intake. Hajhashemy*et al.,* (2022) found that there was an inverse association between calcium intake type 2 diabetes mellitus.

Table 3. Distribution of study subjects by comparing nutrients intake and blood glucose monitoring:

Nutrients	**FBG (*p*-value)**		**PP (*p*-value)**		**HbA1c (*p*-value)**	
	Tribal	**Non Tribal**	**Tribal**	**Non Tribal**	**Tribal**	**Non Tribal**
Energy (kcal)	0.76	**0.00***	0.63	0.52	**0.00***	0.04
Carbohydrate (g/d)	0.86	0.99	0.94	0.75	0.82	0.25
Protein (g/d)	0.31	0.32	0.30	0.19	0.32	**0.01***
Fat (g/d)	0.26	0.21	0.30	0.17	0.62	0.12
Iron (mg/d)	0.29	0.71	0.74	0.60	0.07	0.76
Calcium (mg/d)	0.13	**0.02***	0.33	**0.03***	0.43	0.62
Dietary fibre (mg/d)	0.23	0.84	0.16	0.60	0.83	0.92

*Significant at the 0.05 level

4. CONCLUSION:

Based on the findings, it is evident that both tribal and non tribal communities exhibit significant association with demographic parameters, lifestyle patterns, and clinical findings. Age, weight, height, BMI, alcohol consumption and triglyceride levels emerged as key factors influencing diabetes in both groups. Additionally, nutrient intake, including energy, carbohydrate and protein, and specific food consumption such as cereals and millets, oils, and sugar, displayed correlation with diabetes. Specifically, increase energy and low calcium intake among non-tribal individuals is significantly correlated with the results of the FBG test. Low calcium intake among the non-tribal community was inversely correlated with the results of the PP test. And tribal energy intake and non-tribal protein intake were significantly correlated with the results of the HbA1c test. These findings emphasized the need for understanding and addressing diverse demographic and lifestyle factors to effectively mitigate the burden of diabetes in both tribal and non tribal populations. Further research and targeted public health strategies are required to address the complex interaction of factors contributing to diabetes prevalence and management within this community.

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