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**Original article**

# Clinico-social profile of tribal, nontribal and migrant patients with type 2 diabetes mellitus availing out-patient services in a tribal area of Sakwar in Western Maharashtra, India

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**ABSTRACT:**

**Background:** Diabetes is multifactorial in its causation. A need to identify determinants and risk factors while catering to a varied population was strongly felt. A nuanced approach while treating diabetic patients in primary care settings, taking their needs into account, is more likely to produce better results. The current study aimed to compare the clinico-social profile of Tribal, Non-Tribal, and Migrant diabetic patients availing outpatient services.

**Material and Methods:** A cross-sectional study was conducted in 109 patients availing outpatient care at Sakwar a tribal area in Palghar district of Maharashtra, India. Brief clinico-social history, BMI, and the latest blood glucose levels were noted. Descriptive and multivariate analysis was performed.

**Results:** Of the 109 patients 58 (53.2%) were tribal, 30 (27.5%) were non-tribal and 21(19.3%) were migrant. Family circumstances, work, and dietary patterns showed a difference between the groups. The proportion of addictions was high (56%) and glycemic control was poor in 52.3% of patients. Only 60.6% of patients reported regular compliance to medication. Mean BMI was lowest in Tribal (22.23 ± 1.76) followed by Non-Tribal (24.7 ± 2.7) and Migrant (25.24 ± 3.1) patients. ANOVA ($F(2,106) = 18.045$, $p<0.001$) & Post Hoc analysis showed BMI of tribal patients varying significantly from homogenous subsets non-tribal & migrant patients.

**Conclusion:** There is a need for a greater understanding of factors contributing to diabetes and its control in different communities for creating appropriate need-based interventions. A local registry of Diabetes patients along with a family survey will help.

**Key Words:** type 2 diabetes mellitus, tribal health, migrants, clinico-social profile, BMI

## Introduction

Genetics, rapidly altering lifestyle and diet all contribute to the onset and progression of type 2 Diabetes mellitus (T2DM). The arbitrary application of interventions tested in western populations often fails to show results.[1] The tribal area of Sakwar is home to Warli, Katkari, and Malhar Koli tribes, many of whom work as seasonal laborers in agricultural and non-agricultural sectors. The non-tribal locals are predominantly from Agri and Maratha communities and are involved in farming. There is a growing migrant population from various parts of northern

India who are involved predominantly in the construction business, the supply of building materials, and the running of small shops. While treating diabetic patients from these communities a contrast in the constitution of patients, willingness to comply with lifestyle interventions, and outlook towards glycemic control was observed. There is a need for a greater understanding of socio-cultural norms and clinico-social factors for creating appropriate community-based interventions. The study intended to compare clinico-social profiles in tribal, non-tribal local, and migrant patients with T2DM availing out-patient services in Sakwar.

**Material and Methods**

A cross-sectional study was conducted at Rural Health Training Center, Sakwar over 2 months with prior approval. The study population comprised adults diagnosed with type 2 diabetes and availing treatment at the study site. All 109 diagnosed patients availing treatment at the study site who gave consent were included. Clinico-social case history and examination of each patient was done, anthropometry (Height, Weight, BMI), history of follow up & latest blood glucose levels were noted. Waist Hip Ratio could not be noted as many of the patients were not comfortable with it in a crowded outpatient setting.

Descriptive analysis was done using percentage, mean, and standard deviation. Chi-square test was used to compare discreet variables in tribal, non-tribal, and migrant patients. Nonparametric correlation was used to assess the strength of association. ANOVA was used to compare mean BMI in the three groups followed by post hoc analysis. Multiple linear regression was used to find predictors of BMI.

**Results**

Of the 109 patients 58 (53.2%) were tribal, 30 (27.5%) were nontribal and 21(19.3%) were migrant. (Figure 1) The age-wise comparison did not show any significant difference between the three groups. Around one-third of patients were below 45 years of age and two-thirds were above the age of 45 years. Similarly, there was no significant difference in sex-wise distribution between the groups although 13(61.9%) migrant patients were men. The majority of tribal and non-tribal families were nuclear, whereas migrant families were joint (X2=17.675, df =2, p=0.000145).

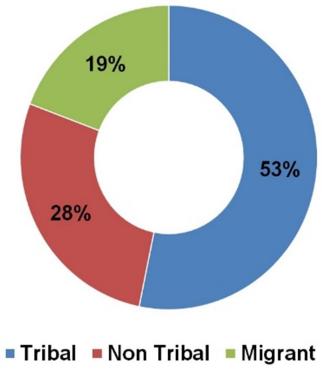


**Figure 1: Distribution of patients**

The majority of tribal and non-tribal families had a mixed diet whereas migrant families were vegetarian (X2=24.56, df=2, p<0.00001). The prevalence of comorbidities and addiction was high in all three groups. Comparing the presence of comorbidities with duration since diabetes there was a weak positive correlation (rho=0.219, p=0.022). Regular intake of medication was associated with the presence of co-morbidities (rho=0.289, p=0.002). A higher proportion of migrants were involved in heavy work as compared to tribal and non-tribal patients. Non-tribal locals had better socioeconomic status as compared to tribal and migrant patients. The prevalence of uncontrolled diabetes was high in all three groups with tribals showing the poorest compliance to medication and treatment. (Table 1) Mean BMI was lowest in Tribal (22.23 ± 1.76) followed by Non-Tribal (24.7 ± 2.7) and Migrant (25.24 ± 3.1) patients. (Figure 2) ANOVA (F (2,106) = 18.045, p<0.001) & Post Hoc analysis by Tukey's HSD showed Tribal patients varying significantly from

homogenous subsets Nontribal & Migrant patients. There was no significant correlation between Blood Glucose levels & BMI (r=0.08, p=0.53). Linear regression model ($R^2$= 0.326, ANOVA: F(2,106)= 21.206, MSE=5.315, p<0.001) showed that being Tribal (beta=0.479,p<0.001) and Socioeconomic strata (beta= -0.236, p<0.01) were significant predictors of BMI.

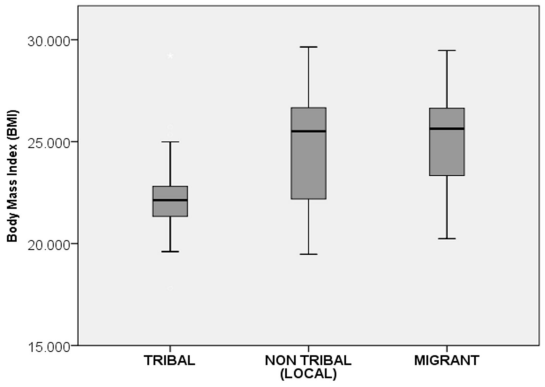


**Figure 2: Boxplot of BMI of patients**

**Discussion**

The study area is tribal and hilly. It has communities living in settlements and people working as seasonal laborers in agriculture, animal husbandry, and brick kilns. The non-tribal locals were landed farmers engaged in agriculture and related occupations. Recent urbanization around Mumbai has led to an increase in construction activity and a rise in the price of land, increasing the affluence in landed class. It has also led to the settlement of migrants from various states of North India, who are engaged in construction, logistics, and small businesses. The health providers had to cater to this diverse group of patients and address their health needs with appropriate, acceptable, and feasible interventions. In order to do so, proper implementation of comprehensive primary health care as envisioned by Ayushman Bharat mission was necessary.[2]

The migrants after settling down usually called for their extended family members to help with the business and share a common kitchen with them. This explains the higher proportion of joint families among migrant patients. Whereas, there was an all-round trend towards nuclear families among locals leading to smaller landholdings. The majority of tribal and non-tribal families had a mixed diet whereas migrant families had a higher proportion of vegetarians. Dietary practices varied among the groups. Therefore, all members of the family especially the women who cooked the food needed to be educated about diet to not only improve glycemic control in the patients but also to reduce risk factors in other members. Such need based interventions have also proved effective in urban primary care setups.[3] Training of youth among communities as diabetes educators can be effective in risk reduction and a source of gainful employment.[4]

The prevalence of comorbidities and addiction was high in all three groups. Studies suggest a need for comprehensive mental health care that can be integrated with diabetes care in low and middle-income countries.[5] The literacy rate was lower than the national average and it was especially poor in women.[6] Migrants being construction workers were involved in heavy work as compared to tribal and non-tribal patients. The prevalence of uncontrolled diabetes was high in all three groups with tribals showing the poorest compliance with medication and treatment. There was a significant difference in BMI of three groups.

Comparing the presence of comorbidities with duration since diabetes there was weak positive correlation. Regular intake of medication was associated with the presence of co-morbidities as patients took cardiac comorbidities more seriously than diabetes. The elderly were dependent financially on their family members and thus could not afford to pay for any additional investigation or referral. The study found BMI to be lower in tribal patients as compared to non-tribal and migrant patients. However, there was no significant difference in glycaemic control between the groups. These findings merit consideration while counseling patients.

**Table 1: Comparison of study variables in Tribal, Non-Tribal & Migrant T2DM patients**

| STUDY VARIABLES | STUDY POPULATION | | | Total n=109 | Chi Square Test |
|---|---|---|---|---|---|
| | Tribal n=58 | Non-Tribal n=30 | Migrant n=21 | | |
| **Age** | | | | | $X^2$=0.086, df=2 |
| • Below 45 years | 19(32.7) | 09(30) | 07(33.3) | 35(32.1) | p=0.957 |
| • Above 45 years | 39(67.2) | 21(70) | 14(66.6) | 74(67.88) | |
| **Sex** | | | | | $X^2$=1.178, df=2 |
| • Male | 28(48.3) | 15(50) | 13(61.9) | 56(51.4) | p=0.555 |
| • Female | 30(51.7) | 15(50) | 8(38.1) | 53(48.6) | |
| **Family Type** | | | | | $X^2$=17.675, |
| • Joint | 14(24.2) | 12(40) | 16(76.2) | 42(38.5) | df=2 |
| • Nuclear | 44(75.8) | 18(60) | 5(23.8) | 67(61.5) | ***p=0.000145*** |
| **Diet** | | | | | $X^2$=24.56, df=2 |
| • Vegetarian | 6(10.3) | 5(16.7) | 13(61.9) | 24(22.0) | **p<0.00001** |
| • Mixed | 52(89.6) | 25(83.3) | 8(38.1) | 85(78.0) | |
| **Hypertension** | 30(51.7) | 13(43.3) | 12(57.1) | 55(50.5) | $X^2$=1.02, df=2 p=0.59 |
| **Tobacco Consumption** | 31(53.4) | 16(53.3) | 14(66.7) | 61(56.0) | $X^2$=1.2, df=2 p=0.54 |
| **Alcohol Consumption** | 21(36.2) | 8(26.7) | 8(38.1) | 37(33.9) | $X^2$=1.0, df=2 p=0.605 |
| **Education** | | | | | $X^2$=1.91, df=2 |
| • Illiterate | 27(48.3) | 13(43.3) | 13(61.9) | 53(48.6) | p=0.383 |
| • Literate | 31(53.4) | 17(56.7) | 8(38.1) | 56(51.4) | |
| **Work** | | | | | $X^2$=15.81, df=4 |
| • Sedentary | 17(29.3) | 6(20) | 6(28.6) | 29(26.6) | **p=0.003** |
| • Moderately Active | 37(63.7) | 18(60) | 6(28.6) | 61(55.9) | |
| • Very Active | 4(7) | 6(20) | 9(42.8) | 19(17.4) | |
| **Socio Economic Status** | | | | | $X^2$=9.1, df=6 |
| • Upper Middle | 6(10.3) | 0(0) | 3(14.3) | 9(8.3) | p=0.167 |
| • Middle | 8(13.8) | 7(23.3) | 2(9.5) | 17(15.6) | |
| • Lower Middle | 25(43.1) | 19(63.3) | 8(38.1) | 52(47.7) | |
| • Lower | 19(32.7) | 4(13.3) | 8(38.1) | 28(25.7) | |
| **Body Mass Index** | | | | | |
| • Underweight | 1 (1.7) | 0(0) | 0(0) | 1(0.9) | $X^2$=26.56, df=6 |
| • Normal | 53(91.4) | 14(46.7) | 10(47.6) | 77(70.6) | **p=0.000175** |
| • Overweight | 4(6.9) | 14(46.7) | 9(42.9) | 27(24.8) | |
| • Grade 1 Obese | 0(0) | 2(6.7) | 2(9.5) | 4(3.7) | |
| **Uncontrolled Blood Sugar Levels** | 32(55.2) | 12(40) | 13(61.9) | 57(52.3) | $X^2$=2.78, df=2 p=0.248 |
| **Regular Medication** | 33(56.9) | 18(60.0) | 15(71.4) | 66(60.6) | $X^2$=1.36, df=2 p=0.504 |

**Note:** Rows were suitably merged to ensure applicability of chi square test.

In Indian populations risk associated with diabetes and cardiovascular diseases occurs at lower levels of BMI when compared with the white population. This is attributed to body fat distribution. Asian Indians tend to have more visceral adipose tissue, causing higher insulin resistance, despite having lean BMI. [7] Over generations tribes have evolved to withstand periods of leanness. Change in dietary patterns, consumption of energy-rich processed food, genetic factors, and altered lifestyle contribute to an increase in the prevalence of diabetes.[8,9,10]

A 'normal' BMI may prove deceptive while treating tribal diabetics as it is not correlated with glycaemic control.[11] Tribal diabetics may not comply with exercise & weight loss interventions commonly advised. Further study regarding the effects of altered dietary habits, lifestyle change, genetic factors in tribal populations needs to be undertaken.

**Conclusions:**

There is a need for a greater understanding of clinico-social factors contributing to diabetes and its control in different communities. Understanding of the determinants and risk factor distribution among the communities can help formulate appropriate need-based interventions.

**Recommendations:**

Community Health Officers (CHOs) manning the Health & Wellness Centers (HWCs) under Ayushman Bharat should be trained to provide Information, Education, Communication (IEC), screen Diabetics, and Pre-diabetics. A better understanding of risk factors in special groups can help policymakers developed need-based strategies. To this end a local registry of Diabetes patients and Family folders of each household must be maintained by health centers.

**Limitations:**

A community based cross sectional study with a larger sample size would give further insights.

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