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## Prevalence of Type 2 Diabetes Mellitus and Anthropological Status in Tribals and Non-Tribals of Paschim Medinipore District of West Bengal

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### **Abstract:**

*Background: The study was carried out to determine the relationship between anthropological status & prevalence of type-2 diabetes mellitus (pre diabetic & diabetic states) among the population of remote areas of Paschim Medinipore district. The tribal subjects predominantly were Lodhas and Munda contributed 15% of total district population. They had their own life style specific customs, survive predominantly on forest food and comparable to non-tribals resident of the same area studied as separate group. A total number of 463 tribals and non tribals were incorporated in this cross sectional study during peripheral health camps conducted in the tribal villages of namely Kultikri and Khajra, remote areas of Paschim Medinipore district. Lodhas (244, 52.9%), Munda (178, 38.5%) and non-tribals (41, 8.18%) were subjected to all anthropometric measurements, and nutritional status assessment following WHO criteria. Diabetic state was confirmed from estimation of blood glucose level (random) was measured in all individuals using single prick glucometer. Blood pressure (BP) was recorded by sphygmomanometer. A major portion of tribals (39 %) were under weight while 11% were over weight, and 45% of non-tribals were overweight with 12% being under weight. Tribal males showed high BP in compare to females but both of the sexes had similar nutritional status surprisingly. The subjects detected to be diabetics were 3.23% among tribals and 7.3 % in non-tribal groups. The Lodhas were found more vulnerable to develop diabetes followed by the Mundas while the non-tribals had the maximum number in prediabetic state. The prediabetic prevalence was 20% in far with any urban city in India. The prediabetic accounted for 4.34% while nearly detected diabetic's accounted for 5.79% in under nourished group. A significant 20.5% were seen in overweight group. While the non urban group comparable to urban dwellers, the predominant prediabetic status among the tribals in the under nourished group is probably attributed to pancreatic beta cell dysfunction, while insulin resistance can explain the prediabetic and diabetic status in the overweight group. Analysis of more tribals and non tribals will clarify the situation in future.*

**Keywords:** Body mass index, diabetes mellitus, blood pressure, tribals

### **1. Introduction**

The main tribes in Paschim Medinipore district comprising of over 15 % of total population are predominantly Lodha and Munda. Each one of these tribes lives in their own habituation and follows their own specific customs, lifestyle and nutrition status. The individual tribes are easily separated from each other by differences in anthropological characteristic. Lodhas were nomadic by nature, collect and sell forest products, reside in hamlet called Tandas, more advanced than other tribes with colourful attire and they are believed to be descendants of Europeans and settled in rugged mountains of Afghanistan and migrated to deccan plateau of West Bengal Whereas, Mundas constitute 80% of tribal population and are fully dependent on forest products. Sorghum is staple crop along with rice, tobacco and roots ('Keski dumpa' and 'Karsi dumpa') these roots are cut and kept in running water for 3 days and boil to make them edible and these roots form the main sustenance food. During toddy palm season, every Munda family live mainly on palm juice which is consumed in community and called 'Gujjadis'. Mundas are not yet urbanized compared to adjacent towns. Both women and men consume brew from a special flower called "Ippa". The Mundas live in thick forests and high mountains (Bose and Bisai, 2007; Ghosh and Bala, 2006; Irshad Ali and Das, 2003). Diabetes mellitus is an endocrinal

syndrome resulted from pancreatic beta cell dysfunction or insulin resistance by cells, which is the seventh leading cause of death (Chatterjee et al., 2012). To determine whether there is any relationship between anthropological status & prevalence of type-2 diabetes mellitus (pre diabetic & diabetic states) among the population (non-tribal and tribal residents) of remote areas of Paschim Medinipore district present study was carried out.

## 2. Materials and Methods

A total number of 463 individuals constituted with 244 (52.9%) Lodhas, 178 (38.5 %) Mundas represented the tribal population and the rest by non tribal population 41(8.18. %) belongs to age group 18-60 years of both sexes were screened in two peripheral community based medical camps in the remote hamlets namely Kultikri and Khajra villages of Paschim Medinipore district. The cross sectional study was conducted among those adult tribal and non tribal population residing in the same geographical area of Paschim Medinipore district. Those tribals and non tribals were assessed for their anthropological and nutritional status individually. Random blood glucose level was measured in all individuals subject under study by pre-calibrated single prick Glucometer and RBG>140mg was considered as pre diabetic and more than 200 considered to indicate a diabetic state (Maiti et al., 2012). Individuals attended the camp were subjected to anthropometric measurements for stature, weight, waist circumference, hip circumference, skin fold thickness, percentage of fat, Body mass index(BMI), WHR (waist hip ratio), WSR (waist stature ratio) were computed using standardized measuring tapes, weighing and stature measurement scales, and Harpenden Calipers (Biswas et al., 2009). Blood pressure (both systolic and diastolic) was recorded by standard Sphygmomanometer (Biswas et al., 2009). Nutritional status of individual group was categorized into under nourished (BMI <18.5%), normal nourished (18.5-25.5) and over nourished (BMI >25%) as per WHO criteria (WHO, 1995).

## 3. Results

A total number of 244 Lodhas & 178 Mundas were selected randomly based on the people attending a tribal health camp along with 41 non tribals residing in the area were included in this study and depicted gender wise (Table 1).

Group	Total	Male	Females
Lodhas	244(52.9%)	94(38.5%)	150(61.5%)
Mundas	178(38.5%)	80(44.9%)	98(55.1%)
Non tribal	41(8.2%)	20(48.8%)	21(51.2%)
Total	463	194(41.9%)	269(58.1%)

Table 1: Distribution of various groups of individual based on tribe wise and gender wise

Results from present study on BMI clearly showed that the overall prevalence of undernourishment is about 35–40 % in both Lodha & Munda tribes while less than 10% are overweight. The non tribal population had the highest proportion (44.11%) of overweight patients with 11.66 % being undernourished (Table 2).

Type	Under nourished (%)	Normal (%)	Overweight (%)
Lodhas	36.50	55.0	8.50
Mundas	39.4	52.8	6.0
Non tribal	11.66	44.23	44.11

Table 2: BMI based Nutritional status between tribes & non tribes

The data from Munda tribals showed that both the genders having similar anthropometrical characteristics. The males tend to higher systolic blood pressure and higher average RBG levels as compared to females (Table 3).

Variables	BMI (Kg/m <sup>2</sup> )	GMT (mm)	WSR	Fat (%)	WHR	Systolic B.P	Diastolic B.P	RBG (mg/dl)
						(mm of Hg)		
Males	21.11	4.30	0.32	87.19	0.87	162.5	82.5	152.75
Females	18.98	4.04	0.34	83.23	0.83	117.5	70.0	72.30

Table 3: Anthropological and physiological characteristics of Munda tribal subjects

From our present study, the data among the Lodha tribals showed a similar pattern as seen in Munda (Table 4).

Variables	BMI (Kg/m <sup>2</sup> )	GMT (mm)	WSR	Fat (%)	WHR	Systolic B.P	Diastolic B.P	RBG (mg/dl)
						(mm of Hg)		
Males	20.9	4.0	0.34	88.02	1.04	142.2	87.5	140.2
Females	19.84	3.89	0.34	84.54	0.82	122.5	84.5	69.17

Table 4: Anthropological and physiological characteristics of Lodha tribal subjects

The data observed among the non tribes showed a similar pattern but weight more with greater BMI and much higher RBG levels while surprisingly the blood pressure levels are lower as compared to tribals (Table 5).

Variables	BMI (Kg/m <sup>2</sup> )	GMT (mm)	WSR	Fat (%)	WHR	Systolic B.P	Diastolic B.P	RBG (mg/dl)
						(mm of Hg)		
Males	24.34	4.59	0.36	87.6	0.89	130.3	84.66	151.7
Females	21.48	4.32	0.38	80	0.84	124.2	77.6	160.6

Table 5: Anthropological and physiological characteristics of non tribal subjects

Summary data of the tribals demonstrate the same observations as detailed above (Table 6 and Table 7).

Variables	BMI (Kg/m <sup>2</sup> )	GMT (mm)	WSR	Fat (%)	WHR	Systolic B.P	Diastolic B.P	RBG (mg/dL)
						(mm of Hg)		
Lodhas	20.9	4.13	0.34	88.0	1.04	142.2	87.5	140.2
Mundas	21.22	4.30	0.32	87.1	0.87	162.5	82.5	152.7
Non tribals	24.34	4.59	0.36	87.6	0.89	130.3	84.66	151.7

Table 6: Comparative physical &amp; physiological analysis in male tribes &amp; non tribes

Variables	BMI (Kg/m <sup>2</sup> )	GMT (mm)	WSR	Fat (%)	WHR	Systolic B.P	Diastolic B.P	RBG (mg/dl)
						(mm of Hg)		
Lodhas	19.84	3.89	0.34	84.54	0.82	122.5	84.5	69.17
Mundas	18.98	4.04	0.34	83.23	0.83	117.5	70	72.30
Non tribals	21.48	4.32	0.38	80.0	0.84	124.2	77.6	160.7

Table 7: Comparative physical &amp; physiological analysis in female tribes &amp; non tribes

The Table 7 showed that the subjects belongs to Lodha tribe had more propensity to develop diabetes mellitus and a significant number of this tribe were found to be prediabetic state (8.6 %) followed by the Mundas (7.8 %) while the non tribal's had the maximum number in pre diabetic state (17.0%). The numbers detected to be diabetics were 15 (3.55%) in tribal's and 7.3 % in non tribal groups. The total number of diabetics detected in these areas were 18 (3.88%) while 42 (9.07%) were in the prediabetic state.

Group	Total number	Pre-Diabetic (RBG > 140 mg%)	Diabetics (RBS > 200 mg%)
Lodhas	244	21(8.6%)	09(3.7%)
Mundas	178	14(7.8%)	06(3.4%)
Non tribal	41	07(17.0%)	03(7.3 %)

Table 8: Total number of diabetics and pre diabetics in tribals &amp; non tribals

#### 4. Discussion

Due to higher physical activity, lower BMI and the routine lifestyle prediabetic & diabetic status among tribals were expected to be lower as these populations are considered to be the least possible to have altered metabolic syndrome. This may be attributable to changing lifestyles of the tribal population with possibly insulin resistance coming into picture in overweight tribals (Chow et al., 2006; Abu Sayeed et al., 2004; WHO, 2004). The prediabetes condition significantly high and fast approaching in semi urban areas while the prevalence of diabetes among tribals is almost similar to prevalence in rural area. Present study showed that Lodas and Mundas males and females have similar anthropometric measurements. This may be attributable to equal physical activity and similar nutrition intake (Mitra et al; 2007). Higher prevalence of acute and chronic under nutrition was observed in other tribal and caste in India (Chandraker et al., 2009) among adolescents (Bose and Chakraborty, 2005) and adults (Kapoor et al., 2009).

The non tribals in the area are predominantly traders, employees with more sedentary life style as compared to tribals. The prediabetic status in this group is almost 20% on par with any urban city of India. The only common thing between tribes and non tribes being the geographical area of residence. While the non urban group showed predominant overweight pre & established diabetics, which is in accordance with earlier studies (Sadikot et al., 2004; Ramachandran et al., 2001; Ramachandran et al., 1999). It is important to note that probably reduced pancreatic beta cell mass in undernourished tribals may be a factor while the overweight diabetics can be explained by insulin resistance and the data among the lodha tribals showed a similar pattern as seen in munda (Kapoor et al., 2010; Ghosh and Bala, 2006). It is interesting to note that not a single case of pre or diabetes has been identified in the normal BMI group. The total number of diabetics detected in these areas were 18 (3.88%) while 42 (9.07%) were in the prediabetic state were in arrangement with earlier studies (Nathan et al., 2007; Naidu and Rao, 1994). More detail evaluation is needed to be done in these pre & diabetic groups and more numbers have to be identified for better understanding the pathogenesis involved.

#### 5. Conclusion

The rapidly increasing propensity of pre diabetic status in tribals needs intensive study. Detailed lifestyle evaluation and greater elucidation of different factors in these tribal populations who form the most backward groups need further surveys.

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