

Original article

Prevalence of type 2 diabetes and anthropometric correlates among tribal and non tribal adult population of Boko Bongaon Block , Kamrup District, Assam

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Abstract

Introduction: The prevalence of chronic non communicable diseases like diabetes is showing an upward trend in most countries, and for several reasons this trend is likely to increase. The estimated number of adults with diabetes in 2007 was 246 million of these, 80% live in developing countries, the largest numbers on the Indian subcontinent and in China. Approximately 85–95% of all cases of diabetes are type 2 diabetes and the worldwide explosion of this disorder is a major health care burden.

Objective: To study the correlation of the prevalence of type 2 diabetes and anthropometric correlates among the tribal and non tribal adult population of Boko Bongaon Block of Kamrup district, Assam. **Material and methods:** A community based cross sectional study was conducted among 330 tribal and 330 non tribal adult respondents. Data were collected by house to house visits and anthropometric measurements were done along with estimation of FBS using glucometer.

Results: The prevalence was highest among the non tribal males (10.1%) followed by non tribal females(7%), tribal females(6%) and least among the tribal males (2.1%). Most of the anthropometric parameters viz. weight, waist circumference, hip circumference, Body Mass Index (BMI) and WHR were significantly higher among the diabetics than those of the non diabetics more among the non tribal than tribal males, among females differences were not so significant.

Conclusion: The anthropometric parameters were found to be significantly high among the diabetics than the non diabetics in the non tribal category.

Keywords: Body Mass Index (BMI), Waist Hip Ratio (WHR), Hip circumference (HC), Waist circumference(WC), Fasting Blood Sugar (FBS)

Introduction

Diabetes mellitus has become a major public health problem across the world and is associated with enormous personal, social and economic burden. The prevalence of diabetes is rapidly rising all over the globe at an alarming ⁽¹⁾. The dramatic rise in the prevalence of type 2 diabetes and related disorders like obesity hypertension, and the metabolic syndrome could be related to the rapid changes in lifestyle that has occurred during the last 50 years. From 31.71 million diabetic subjects in year 2000 to

an expected 79.44 million diabetics by the year 2030 ⁽²⁾, India is on its march towards having the most number of diabetics worldwide and is aptly called the 'diabetic capital' of the world. In 2010 the average age adjusted prevalence of diabetes in India was 7.8%, higher than that in most European countries. ⁽³⁾

There has been a number of studies on the prevalence of diabetes in different parts of India. But there has been very few studies in the north eastern part of India. One such study was done by S K Shah et al

(1998) in the urban population of Guwahati city of Kamrup district, Assam in the year 1998 where prevalence was found to be 8.2 %⁽⁴⁾. Apart from these there have been no such studies on the prevalence of diabetes in the Kamrup district. There has been no comparative studies between tribal and non tribal population on the prevalence of diabetes in this part of the country as that in the other parts of the country. So a study was done to ascertain the prevalence of diabetes and its correlates among the tribal and non tribal adult population of Boko Bongaon Block of Kamrup District, Assam and thereby to provide recommendations based on study finding.

The present study had been undertaken in the Boko-Bongaon Community Development Block which comes under Kamrup district of Assam. The block was started in 1959. It is situated at a distance of about 85 Km from the capital city of Guwahati, Assam and connected by NH-37 highway. Majority of the population are tribal which mainly consists of Rabha, Bodo-kachari and garo tribes distributed throughout the block. Majority of the population is dependent on agriculture and paddy cultivation. The majority of the population belongs to lower and lower middle socio economic class.

Aims and objectives

To study the correlation of various anthropometric correlates with the prevalence of diabetes among the tribal and non tribal adult population of Boko Bongaon Block of Kamrup District, Assam

Materials and methods

A cross sectional study was conducted among the tribal and non tribal adult population of Boko Bongaon Block of Kamrup District, Assam. A total 660 adult respondents of age 30-60 years who were permanent residents were taken for the study after

obtaining their informed consent of which 330 were tribal and 330 non tribal.

Adults with serious or acute medical illness other than diabetes, Pregnant women, adults who were on drugs like corticosteroids, OCPs, β blockers, etc and respondents who were not willing to participate were excluded from the study. The present study was under taken for a period of one year (Aug 2014 to July 2015). Permission to conduct the study was obtained from the Institutional Ethics Committee, Gauhati Medical College, Assam before the commencement of the study.

The sample size was calculated by taking the prevalence of diabetes as 13.2% (as found in a study done in rural Godavari by Clara K Chow et al., 2005). Taking a power of 80% with 95% confidence interval and using the formula $N = 4pq/L^2$ where, N = required sample size p = prevalence, q = (1- p), and L = 20% of p (relative error), the minimum sample size required for the study was calculated to be 658 which was rounded off to 660.

From the total tribal and non tribal villages, 10 tribal and 10 non tribal villages were selected through cluster random sampling using the method of probability proportional to size. From each selected village 33 households were selected randomly and from each selected household the eldest adult available during home visit irrespective of gender is taken to get the total sample size of 660 i.e. $33 \times 10 = 330$ from the selected tribal villages and $33 \times 10 = 330$ from the selected non tribal villages. In case no adult was found in a household or did not fulfill our inclusion and exclusion criteria then the next nearest household was taken. If the required number of sample units was not met in that village, then the adjacent village was taken to get the remaining sample units.

The interviews were conducted by house to house visits. Data were collected by using semi structured schedule by interviewing the eldest adult irrespective of gender present in each selected household during the visit for evaluating the correlates. They were interviewed and observations were done. Information was collected on socio demographic profile like age , sex, religion, caste, marital status, type of family , family history of diabetes, occupation, education, income, dietary intake, physical activity, alcohol and tobacco consumption ,any history of diabetes and hypertension in past and present.

This was followed by anthropometric measurements like weight, height, waist and hip circumference of each interviewed adult and measurement of blood pressure. All selected adults were then tested for fasting blood sugar(FBS) using glucometer and those having FBS more than or equal to 126mg/dl were taken as diabetic. Those with blood glucose levels between 100 to < 126mg/dl mg/dl

were taken as impaired or prediabetes. Those having FBS below 100mg/dl were taken as normal (American Diabetes Association ,ADA 2003). Known diabetics on oral hypoglycemic agents were taken as diabetic irrespective of their FBS levels.

Results

The present study was carried out among 660 subjects of which 330 were tribal and 330 were non tribal adult respondents. Tribal respondents consisted of 145 males and 185 females whereas non tribal consisted of 158 males and 172 females.

The prevalence of diabetes was found to be 8.4% among the non tribal whereas it was 4.2% among the tribal adult respondents (Table 1), the difference being statistically significant.

Table 2 reflected that among the tribal respondents majority of the total diabetics i.e. 11 out of 14 diabetics were females whereas among the non tribal respondents majority of the total diabetics i.e. 16 out of 28 were males .

Table 1. Table showing prevalence of diabetes among tribal and non tribal adult respondents

Category	Non Diabetic (FBS<126 mg/dl)	Diabetic (FBS≥126 mg/dl)	Total
Tribal	316 (95.8%)	14 (4.2%)	330
Non Tribal	302 (91.6%)	28 (8.4%)	330
Total	618 (93.6%)	42 (6.4%)	660
P value = 0.0371			

Table 2 . Table showing prevalence of diabetes among the tribal and non tribal adult respondents according to gender

Gender	TRIBAL			NON TRIBAL		
	Non diabetic (FBS<126 mg/dl)	Diabetic (FBS≥126 mg/dl)	Total	Non diabetic (FBS<126 mg/dl)	Diabetic (FBS≥126mg /dl)	Total
Male	142 (97.9%)	3 (2.1%)	145 [43.9%]	142 (89.9%)	16 (10.1%)	158 [47.9%]
Female	174 (94%)	11 (6%)	185 [56.1%]	160 (93%)	12 (7%)	172 [52.1%]
Total	316 (95.8%)	14 (4.2%)	330 [100%]	302 (91.5%)	28 (8.5%)	330 [100%]
	P value = 0.1021			P value = 0.3287		

N.B. The figures in the parenthesis () indicate row wise percentages

Table 3. Distribution of anthropometric parameters among the tribal and non tribal adult male respondents according to their FBS levels

VARIABLES	TRIBAL			NON TRIBAL		
	Non diabetic (FBS<126mg/dl) (n=142; 97.9%) Mean ± SD	Diabetic (FBS≥126mg/dl) (n=3; 2.1%) Mean ± SD	't'	Non diabetic (FBS<126mg/dl) (n=142; 89.9%) Mean ± SD	Diabetic (FBS≥126mg/dl) (n=16; 10.1%) Mean ± SD	't'
Height (cm)	166±5.2	165±6.5	0.2647	167±7.1	165±4.1	1.687
Weight (cm)	53.1±5.4	65.2±4.8	4.309*	54±7.2	63±8.1	4.259***
Waist Circumference (cm)	68.2±4.2	77.4±3.4	4.613*	70±5.2	78.2±4.1	7.361***
Hip Circumference (cm)	82.2±3.2	84.6±1.2	3.23	82.4±1.2	85.7±4.5	2.922*
BMI (kg/m ²)	18.9 ± 1.9	24.5 ± 2.2	4.375*	20.1 ± 2.5	24.8 ± 3.2	5.683***
WHR	0.82±0.03	0.88±0.06	1.727	0.86±0.04	0.91±0.06	3.253**

*p<0.05, **p<0.01, ***p<0.001

From table 3 it was found that among the tribal adult male respondents anthropometric parameters viz. weight, waist circumference and Body Mass Index(BMI) were significantly higher among the diabetics than those of the non diabetics whereas there was no significant difference between the two groups in matter of height. Hip circumference and WHR were also higher among the diabetics than those of non diabetics but the difference not significant. Among the non tribal adult male respondents all anthropometric parameters except height viz. weight, waist circumference, hip circumference, Body Mass Index (BMI) and WHR

were significantly higher among the diabetics than those of the non diabetics.

Table 4 showed that among the tribal adult female respondents Waist circumference, BMI, WHR were higher among the diabetics than those of the non diabetics but difference was not significant. Among the non tribal adult female respondents Weight , BMI and WHR were significantly higher among the diabetics than those of the non diabetics whereas waist circumference and hip circumference were higher among diabetics than non diabetics but not significant. The stature was comparable among both diabetics and non diabetics in both tribal and non tribal female respondents.

Table 4. Distribution of anthropometric parameters among the tribal and non tribal adult female respondents according to their FBS levels

VARIABLES	TRIBAL			NON TRIBAL		
	Non diabetic (FBS<126mg/dl) (n=174; 94%) Mean ± SD	Diabetic (FBS≥126mg/dl) (n=11; 6%) Mean ± SD	't'	Non diabetic (FBS<126mg/dl) (n=160; 93%) Mean ± SD	Diabetic (FBS≥126mg/dl) (n=12; 7%) Mean ± SD	't'
Height (cm)	155±4.5	154±5.5	0.5907	154±6.2	154.3±6.5	0.000
Weight (cm)	46±4.1	44.1±3.2	1.874	45±5.2	48±4.5	2.202*
Waist Circumference (cm)	64±3.2	64.9±4.2	0.698	65.5±6.1	66.1± 5.1	0.3873
Hip Circumference (cm)	84.5±2.3	84.1±4.3	0.3058	83.2±6.1	84.1±5.6	0.5335
BMI (kg/m ²)	18.6±2.1	19.1±3.1	0.5273	18.7±1.3	20.2±2.3	2.233*
WHR	0.79±0.03	0.82±0.05	1.968	0.82±0.03	0.85±0.04	2.545*

*p<0.05, **p<0.01, ***p<0.001

Discussion

The prevalence of diabetes was found to be 8.4% among the non tribal which was twice of that among the tribal respondents (4.2%).

Similar difference in prevalence of diabetes was also found in studies done by Chaturvedula R et al (2014)⁽⁵⁾ in a study done to evaluate the anthropological status and prevalence of Type 2 Diabetes Mellitus in tribals and non-tribals of Khammam district of Andhra Pradesh found the prevalence of diabetics to be (4.13%) in tribals and 8.8 % in non tribal Groups. Dash S S et al(2015)⁽⁶⁾ in another study done to evaluate the prevalence of Type 2 Diabetes Mellitus and anthropological status in tribals and non-tribals of Paschim Medinipore district of West Bengal found the prevalence of diabetes to be 3.23% among tribals and 7.3 % in non-tribals.

The overall prevalence of diabetes among both tribal and non tribal was found to be 6.4% which was close to the estimated prevalence of diabetes in India as 7.1% for the year 2010 in a study done by Shaw JE et al (2010)⁽⁷⁾ using a population based methodology based on three studies done in 2001, 2004 and 2008, by ADA diagnostic criteria.

Both in the tribal and non tribal category female respondents were more than males with more female respondents in the tribal category. The prevalence of diabetes was more among the tribal females (6%) than the tribal males (2.1%) whereas among non tribal males prevalence of diabetes was highest (10.1%) with non tribal females being (7%) which showed that tribal males had the lowest prevalence of diabetes and non tribal males the highest.

As evident from table 3 that among the tribal males the parameters weight, waist circumference and BMI in the diabetics are significantly higher than their non diabetic counterparts. Among the non tribal

males also the parameters weight, WC and BMI are higher among the diabetes than among the non diabetics the difference being extremely significant. Other parameters WHR was significantly higher among the diabetes than the non diabetes among the nontribal males but the difference was not significant in case of tribal males. Though there was a good difference in HC of diabetics and non diabetics among the tribal males the difference was shown to be not significant. This discrepancy was because of the small number of diabetics (n=3) in the tribal male category. This shows that all the anthropometric parameters except height were significantly higher in the diabetics than the non diabetics in the both tribal and non tribal male category (with the exception of WHR and HC in the tribal male category where significant difference was not found).

As evident from table 4 that among the tribal females none of the parameters were shown to be significantly higher among the diabetics than among the non diabetics whereas among the non tribal females the parameters Weight, BMI and WHR were shown to be significantly higher among the diabetics than among the non diabetics. The Stature was comparable among diabetics and non diabetics in both tribal and non tribal category.

From these it was clear that prevalence of diabetes was highest (10.1%) among nontribal males with very high significant increase in almost all anthropometric parameters in the diabetics than the non diabetics whereas the prevalence was lowest (2.1%) among tribal males with some parameters i.e. weight, WC and BMI being significantly high in diabetics than non diabetics. The prevalence of diabetes was near about same among the tribal and non tribal females (6% and 7% respectively). Among the females Weight, BMI and WHR were

significantly higher in diabetics than non diabetics in only non tribal females category. As indicated from history the low prevalence of diabetes among tribal males may be due to their increase physical activity in their day to day lives where most of the males and some females also were actively involved in agricultural activity all day long and also may be due to their dietary habits which include non spicy boiled food items.

Conclusion

The prevalence of diabetes was highest amongst the non tribal males and lowest among the tribal males.

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Almost all anthropometric parameters shown here were found to be higher in the diabetics among the nontribal males whereas few were increased in the diabetics among the tribal males.

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