OBESITY AND DIABETES IN AN INDIGENOUS “VADDA” POPULATION OF RURAL SRI LANKA

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ABSTRACT

Introduction: Economic development and the associated lifestyle changes have led to a rise in prevalence of diabetes among adult population of Sri Lanka. A similar lifestyle changes are observed among indigenous population (Vadda) population of Sri Lanka. However, there is limited data available regarding prevalence of diabetes among Vadda population in Sri Lanka. This study was conducted to determine the prevalence of type 2 diabetes, impaired fasting glycaemia (IFG) and obesity among rural indigenous Vadda population of Sri Lanka.

Methods: A cluster sampling of 91 subjects above 18 years of age in an indigenous community were investigated. Fasting plasma glucose, blood pressure, height, weight, and abdominal circumference were measured and BMI were calculated.

Results: The prevalence of type 2 diabetes among Vadda population was 2.19% and IFG was 5.49 %. The prevalence of overweight and obesity among males were 15% and 2.5% and 19.6% and 3.9% among females. Prevalence of obesity and diabetes among Vadda population were very much lower compared to the general population of the country. However, almost one third of this population is below the BMI of 18.5kgm⁻².

Conclusions: The prevalence of obesity and diabetes among Vadda community is very much lower compared the rural population of Sri Lanka. However, underweight problem is still a concern.

Key words: Indigenous population, Vadda, Diabetes mellitus, obesity, Sri Lanka

INTRODUCTION

Obesity and the associated type 2 diabetes are two major global health problems. The recent epidemiological data suggest that the incidence of diabetes is rising (1) and the south Asian countries have a very high incidence of type 2 diabetes (2). According to a study done in 2005 covering seven provinces, the prevalence of diabetes and any form of dysglycaemia in Sri Lanka was 10.3% (9.4–11.2%) and 21.8% (20.5–23.1%) respectively.

Vadda is a common term used to describe the indigenous population of Sri Lanka. This tribal community

is believed to be related to pre historic communities of the country and have been living in Sri Lanka for a longer period than the current main communities such as Sinhalese, Tamils and Muslims. Currently, it is estimated that there are about 10,000 Vaddas living in small clusters scattered over central and eastern parts of Sri Lanka. They have their own unique culture, language, religion and rituals. Their habitat is within or adjacent to forest areas of the country. They are traditionally hunter gatherers who lived on by hunting small animals, mainly deers and monkeys for food and gathering yams and honey from the forest.

According to survey done by

university of Colombo in 2011, only 10% this population is involved in Paddy farming and 50% of these families are involved in Chena cultivation (a form of slash and burn cultivation) and 15% work as manual laborers mainly on adjacent villages as the main form of employment (3). Currently, Vaddas are among the poorest communities of the country. Traditionally, they had only two main meals per day and even today only about 65% of families eat 3 meals a day and 52% of families had income less than Sri Lankan Rupee 5000 (\$40) a month.

With the transition from hunter gatherers to more farming community, their dietary patterns have

changed quite remarkably with time and now their diet mainly consists of carbohydrates such as Maize, Kurakkan, Rice and yams and legumes such as Cow pea in addition to the small quantity of protein they gather by hunting monkeys, deer, wild boar and monitor lizards. This gradual transition from hunting community to a farming community has made them less active and to eat more carbohydrates. This lifestyle shift seems to have dramatic consequences for the prevalence of obesity and diabetes in this community. The objective of this study was to study the prevalence of obesity and diabetes among the indigenous (Vadda) population of Sri Lanka.

STUDY DESIGN AND METHODS

This study was conducted in February 2013 and the study population was selected from a remote village called Pollebedda inside the Galoya national wildlife sanctuary, which is about 300 kilometers from Colombo, in the Ampara district, eastern province of Sri Lanka. According to government statistics, there were 455 families with a total population of 2407 including children (1506 males and 901 females) in this village. With the assistance of the head of the indigenous clan and the cultural officer of the District secretariat, 25 houses were selected for the study. All the adults in those houses, age more than 25 years were included in the study.

Each house was visited on the day previous to the study and they were informed about the objectives of the study and the procedural details including overnight fasting and venesection for blood sampling. After obtaining informed consent, they were kept fasting after 10 p.m. A team of nurses and doctors of General Hospital Ampara volunteered to visit the houses and to collect blood samples and anthropometric data on the following day. None of the adults refused consent for the study.

Weights were measured with light clothes without shoes using a calibrated weighing scale. The height was measured while the subject standing in erect posture vertically touching a wall looking horizontally. The WHO protocol for measuring waist circumference was adopted and the measurement was made at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest with a plastic tape (4).

Using aseptic precaution, 5ml of venous blood was taken for fasting plasma glucose using aseptic precautions and plasma glucose levels were assessed by the glucose oxidase (enzymatic oxidation) method. Fasting blood sugar of more than 127 mg/dl and 100-126 mg/dl were used to diagnose diabetes and impaired fasting glucose (IFG) respectively (5).

The BMI levels were calculated according to WHO risk categories for Asian BMI (6). BMI of less than 18.5 kg/m² was considered as underweight, a BMI of 18.5–23 kg/m² was considered as increasing but acceptable risk, a BMI of 23–27.5 kg/m² as increased risk and a BMI of 27.5 kg/m² or higher as high risk.

The abdominal circumference was classified according International Diabetes Federation criteria for ethnic or country-specific values for waist circumferences and the waist circumference of males more than 90 cm and females more than 80 cm

were considered having abdominal obesity (7).

Data were analyzed with SPPSS 10.5 software. Prevalence of diabetes and pre-diabetes were calculated and the prevalence of obesity according to BMI and abdominal obesity was calculated and compared with national values.

RESULTS

There were 91 adults in the study population consisting of 40 (43.5%) males and 51 (56.1%) females. The average age (95% confidence interval) of the study population was 45.5 (44.35-46.65) years. The mean ages of the females and the males were 42.9 (38.5-47.2) years and 48.8 (44.8-52.7) years respectively. The mean height and weight of the males were 160 cm (156.5-163.5 cm) and 53 kg (50.9 - 56.51 kg). The mean height and the weight of females were 150.2 cm (147.4-152.9 cm) and 47.0 kg (44.2-49.4 kg) respectively. On average, the females were 10.4 cm shorter compared to males. The body mass index males and females were 20.21 kgm⁻² (19-21.3 kgm⁻²) and 20.4 kgm⁻² (19.31-21.49 kgm⁻²) respectively. The females were marginally obese than males (Table 1). These values were lower compared to national values of BMI for males and females, which are 21.1 kgm⁻² (20.9–21.3 kgm⁻²) and 22.3 kgm⁻² (22.1–22.4 kgm⁻²) respectively (8).

Table 1: Mean Age, Height and Weight of the population

	Males (n=40)	Females (n=51)
Mean age (years), 95% CI	48.8 (44.8-52.7)	42.9(38.5-47.2)
Mean height (cm), 95% CI	160 (156.5-163.5)	150 (147.4-152.9)
Mean weight (kg), 95% CI	53(50.9-56.6)	47.0(44.2-49.4)
Mean BMI (kgm ⁻²), 95% CI, 95% CI	20.21(19-21.3)	20.4 (19.3-21.49)
Mean abdominal circumference (cm), 95% CI	79.9 (77.0-82.7)	82 .2 (79.5-84.8)

Table 2: Prevalence (percentage) of overweight obesity and abdominal obesity in study population and Sri Lanka

	Study population		Sri Lanka	
	Male	Female	Male	Female
BMI 23-27.5	15%	19.6%	22.6%	28%
BMI> 27.5	2.5%	3.9%	7.2%	11.3%
Central Obesity*	12.5%	27.5%	16.5%	36.6%

*abdominal circumference >90cm in males and > 80cm in males

OBEISITY

According to the proposed World Health Organization cut-off values of BMI for Asians, there were only 15% overweight and 2.5% obese males in this Vadda population. Although it was not statistically significant, the incidence of overweight (19.6%) and obesity (3.9 %) problems were slightly higher among females of this community. However, the prevalence of obesity and overweight problem among Vadda population is lower than that of the national figures (Table 2) for both males and females (8).

As a measure of central obesity, abdominal circumferences were measured and the mean waist circumference of the males was 79.9 cm (77.0-82.7 cm) and 82.2 cm (79.5-84.8 cm) in females. This indicates the higher prevalence of central obesity among females. There were 12.5% males and 27.5% females with central obesity (abdominal circumference of more than 90 cm for males and more than 80 cm for females) indicating a higher prevalence of central obesity among females of this tribal community. When compared with the national figures (Table 2), prevalence of central obesity was very much lower among Vadda population (8).

DIABETES AND IFG

The prevalence of diabetes among Vadda population was 2.1%(2.5% of males and 1.9% of females). This figure is very much lower to the 8.7%

Table 3: Percentage of adult Vaddas with BMI values <15, 15-18.4 and more than 18.5 in three different studies

Study year	Number		BMI<15		BMI 15-18.4		BMI >18.5	
	M	F	M	F	M	F	M	F
1971-1973*	13	08	0%	0%	46%	38%	54%	62%
1993-1994*	52	64	6%	12%	50%	59%	44%	29%
2013	40	51	5%	4%	25%	23%	70%	71%

8.7% of prevalence in the rural population of Sri Lanka according to the Sri Lanka Diabetes, Cardiovascular Study (SLDSC) conducted in 7 provinces in 2007 (10). The prevalence of IFG in Vadda population is 5.5% (7.5% for males and 3.9% for females), which is lower than the national figure for rural population of Sri Lanka (8.6% for men and 7.7% for women) (Table 4).

DISCUSSION

Tribal communities who are used to simple lifestyles are prevalent thought out the world. Due to the marked differences of their food

habits and the level of activity during daily activities, the prevalence on non-communicable diseases were very much lower in these communities compared to the general population. However, with the lifestyle changes towards a modern society has caused a major shift in the prevalence of obesity, diabetes and IFG among these tribal communities and this change is seen even among our indigenous communities (3, 9). In the isolated Vadda community that we studied, the prevalence of obesity, diabetes and IFG were still very much lower compared to rural population of Sri Lanka. However, the underweight problem is still a concern.

Table 4: Prevalence (percentage) of Diabetes Mellitus (DM) and Impaired Fasting Glucose (IFG) in study population

	Study population			General population
	Male	Female	Total population	
DM	2.5%	1.9%	2.1%	8.7%
IFG	7.5%	3.9%	5.5%	
DM+IFG	10%	5.8%	7.6%	

Although, diabetes is prevalent among this indigenous community, the prevalence is very much lower compared to the national figures (3, 9, 10). Due to the economic development and due to the mixing up with the local community, the lifestyle of the Vadda population has changed during last few decades. Pollebedda, the village that we studied is situated about 10 km away from Mahaoya and it is the same population that was described by Dr. R. L. Spitell one of the three surgeons working in the then General Hospital of Colombo, in his famous books *Far-Off things* (1933), *Savage sanctuary* (1941) vanished trail (1950) where the white Sambar Roams (1951) and *Wild white Boy* (1958). This population was relatively isolated from other communities as they live away from main roads in a wildlife sanctuary and considered unsafe to travel during the last 30-year period due to the civil war. Therefore, the life style of this community has change very little over the past three decades. The lack of environmental influence with the economic development that we see in other communities, is probably the reason for low incidence of diabetes and IFG in this community. Their active lifestyle could have been another strong protective factor. Whether there is a genetic contribution needs to be investigated further.

The incidence of obesity was very much lower among Vadda population compared to the rural community of Sri Lanka and this could be due to their active life style, which involves significant amount of walking for hunting and hard labor in the fields. However, poverty has a direct relationship with the prevalence of malnourishment and the underweight problem of a community and this probably is playing an important role for the higher prevalence of underweight problem among adults of this tribal community. Although there is an improvement of malnutrition and underweight problem when compared with previous studies done in 1969 and 1996 in similar populations,

there is a lot to be done to improve the nutritional status of this community.

Due to the change in the lifestyle during the last few decades, there has been a change in the prevalence of diabetes and IFG among Vadda population of other areas and it is almost similar to prevalence in rural communities of Sri Lanka (10). These findings highlight the importance of early interventions in related to the appropriate health promotion interventions to avoid malnutrition without creating a situation of over-nutrition for this indigenous community of Sri Lanka.

CONCLUSIONS

Due to the rapid urbanization and the modern lifestyle, obesity and diabetes have become major health problems. However, the prevalence of obesity and diabetes are very much lower among indigenous community of Sri Lanka. Although there has been an improvement with the prevalence of malnutrition and underweight problem in this community, it is a health concern that needs to be addressed by the health authorities.

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