Nutritional status among the adult males of the Thengal Kachari and Dibongiya Deori of Lakhimpur District, Assam

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ABSTRACT

Background: *Nutritional status plays a vital role in deciding the health status of an individual. Tribal groups are among the most underprivileged people which comprise about 8.60% of the total population of India. The Thengal Kachari and Dibongiya Deori are the indigenous tribe of Assam and are a patrilineal segment.* **Aims and Objectives**: *This study is an attempt to examine the nutritional status of Thengal Kachari and Dibongiya Deori adult males in terms of selected anthropometric measurements. An estimation of the prevalence of underweight and overweight is presented in making a comparative study between the two populations and to analyse the effect of bio-social factors such as age, marital status, education income, family size and occupation.* **Materials and Methods**: *The present cross-sectional study was conducted among 260 adult males (115 Thengal Kachari males and 145 Dibongiya Deori males) with ages ranging from 18 to 74 years of two separate villages viz., Mornoi Thengal Gaon and Bordeori Gaon respectively under Lakhimpur district of Assam. Body Mass Index (BMI) is used to classify nutritional status of the adult population.* **Results**: *The prevalence of under-nutrition is quite high among the Thengal Kachari (13.04%) compared with the Dibongiya Deori (8.97%). However, the proportion of overweight, by and large, seems to be similar in both the Thengal Kachari (30.44%) and Dibongiya Deori (31.72%) population. There are statistically significant differences between Thengal Kachari and Dibongiya Deori in the prevalence of underweight with regards to conicity index (χ^2 =4.45, df=1, p<0.05) and waist to hip ratio ($\chi2$ =6.36, df=1, p<0.05). However, with regards to the prevalence of overweight, the chi-square shows non-significant differences between Thengal Kachari and Dibongiya Deori adult males except with conicity index (χ^2 =4.47, df=1, p<0.05).* **Conclusions**: *The findings showcase that under-nutrition is more prevalent among the Thengal Kachari although their economic condition is much more favourable than the Dibongiya Deori. The effect of socio-economic factors like marital status was clearly perceptible especially in terms of underweight in the study population.*

Keywords: Anthropometry, BMI, Nutrition, Underweight, Overweight.

INTRODUCTION

Health and well being of any individual depend on various factors like physical, social, psychological and nutritional factors. Nutrition is the sum total of the processes involved in the intake and utilization of food substances by living organisms, including ingestion, digestion, absorption, transport and metabolism of nutrients found in food (Melvin, 2006); a fundamental pillar of human life, health and development throughout the entire lifespan. It is influenced by the adequacy of food intake both in terms of quantity and quality and also by the physical health of the individual. The nutritional status of an individual is often the result of many interrelated factors which affect foetal development, adolescent sexual development and adult height and weight. Malnutrition is the main nutrition problem which is defined as a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrient. The spectrum of nutritional status spread from obesity to severe malnutrition. According to the National Family Health Survey (NFHS-4, 2017) done in India, under-nutrition is more common in rural areas, whereas overweight and obesity are more than three times higher in urban areas. According to the World Health Organization factsheet, almost 462 million adults are underweight and 1.9 billion are overweight category respectively (WHO, 2017).

Studies worldwide have investigated the anthropometric characteristics and nutritional status of the adults of different ethnic groups (Strickland and Ulijaszek, 1993; Chiu *et al*., 2000; McLorg, 2005; Kikafunda and Lukwago, 2005). BMI is generally considered a good indicator of not only the nutritional status but also the socio-economic condition of a population, especially the adult population of developing countries (Khongsdier, 2002, Adak *et al*., 2006). In fact, nutritional status grossly depends upon the feeding habits, ecology, vegetation of the area and the socioeconomic condition of the community (Jaiswal, 2018). The tribal population is at higher risk of a nutritional problem because of their dependence on primitive agricultural practices and irregularity of food supply (Kapoor *et al*., 2009). It has been suggested (Banik *et al*., 2005; Banik, 2007) that there is an urgent need to evaluate the nutritional status of various tribes of India and especially in Assam. Such studies can potentially be used to highlight the severity and uniqueness of nutritional problems among tribal and other underprivileged and underserved populations in India. There is very little information available regarding the nutritional status of the adult males of Thengal Kachari and Dibongiya Deori of Assam. Hence to fill up some of this knowledge gap, the present study was carried out to assess the nutritional

status of the adult males of Thengal Kachari and Dibongiya Deori Schedules tribe population of Assam.

MATERIALS AND METHODS

The present study is preliminary. The fieldwork of the present study was conducted on two heterogeneous ethnic tribes namely- The Thengal Kachari and the Dibongiya Deori in two separate villages viz., Mornoi Thengal Gaon and Bordeori Gaon respectively under Lakhimpur district of Assam. The Thengal Kachari of Mornoi Thengal Gaon does not have any common dialect or script of their own. They speak in the Assamese language. The Dibongiya Deori of Bordeori village has their own Deori dialect and has a script too. Moreover, they speak Assamese fluently to communicate with their neighbouring people and communities. The main occupation of both the community is agriculture. Both the community are a patrilineal segment.

As far as the present study is concerned, no attempt has been made to apply any statistical sampling technique for the selection of the village as well as the individuals. The subjects taken were seen to be free from any physical deformities and not suffering from any diseases at the time of data collection. The study was carried out on 260 adult males (115 Thengal males and 145 Deori males) with ages ranging from 18 to 74 years.

Age groups-: The individuals of both the communities found within the age range of 18 to 74 years were grouped under three categories based on their ages for easy assessment classified as an individual belonging ≤ 34 years, individual in between the age of $35 - 54$ and the individual who are ≥ 55 years.

Income groups: The per capita monthly income of the household was adopted for classifying the three economic groups.

Above 75$^{\text{th}}$ percentile (above ₹ 3362) = High-income group

Between 50$^{\text{th}}$ to 75$^{\text{th}}$ percentile (₹ 1694 - ₹ 3362) = Middle-income group

Below 50$^{\text{th}}$ percentile (below ₹ 1694) = Low-income group

Educational Level: The data on the educational attainment of individuals in the present study were arbitrarily classified as follows: Individuals who were unable to read and write were classified as **Illiterate**. The individual who was able to read and write and those who attended school up to standard **V** were grouped into the **Primary level** of education. The individuals with the educational standard of **VI** and above are included in the category of **Secondary and above** of education due to inadequate data.

Family size: Data on family size was classified into three groups: **(1) Ideal or Small** – a family consisting of four or fewer members. **(2) Medium** – a family consisting of five or seven members. **(3) A large** – family consisting of more than seven members.

Occupation: The male adults of the present study were classified on the basis of their diverse occupations into three categories. They are - (1) Agriculture, (2) Government service and (3) Others; including jobs like animal husbandry, daily labourers, private jobs, dependents, pensioners, business etc.

Anthropometric measurement: A cross-sectional method of anthropometric study was adopted for assessing the body composition and nutritional status of adults aged 18-74 years. Some selected anthropometric measurements from the basic list of measurements, which was recommended by the International Biological Programme (Weiner and Lourie, 1981) was taken into consideration for the purpose of the present study. Following are the anthropometric measurements taken on the selected subjects wearing light apparel-Weight (kg), Height (cm), Sitting Height (cm), Waist Circumference (cm) and Hip Circumference (cm). Anthropometric indices such as (1) Waist- Hip ratio (WHR), (2) Waist to Height Ratio (WHtR), (3) Cormic index and (4) Conicity index were analysed for the present study. The nutritional status of the adult Thengal Kachari and Dibongiya Deori males were assessed utilizing the BMI Cut-off points as recommended by the WHO (2000) used to assess the population for the Asia Pacific. Data were analyzed using SPSS software (20 versions).

Nutritional Status	Cut-off points (BMI kg/m^2)
Underweight	≤ 18.5
Normal	$18.5 - 22.9$
Overweight	≥ 23.0

RESULTS
Socio-economic Factors

      The percentage distribution of the Thengal Kachari and Dibongiya Deori adult males on the basis of various socio-economic backgrounds such as age group, marital status, education, income group, family size and occupation were shown in Table 1. The total sample is composed of 260 male individuals. Out of which 41.92%, 39.23% and 18.85% were in the age groups ≤ 34, 35-54 and ≥ 55 years, respectively. The proportion of Thengal Kachari men (48.70%) being the largest under the category of age-group ≤ 34 years and among Dibongiya Deori men (44.83%) the largest proportion was within the age-group of 35-54 years.

The combined sample of the study population shows 20.00%, 76.15% and 3.77% of unmarried, married and DSW (Divorce, separated and widower) men, respectively. Out of 115 Thengal Kachari males, 20.87%, 75.65% and 3.47% belonged to unmarried, married and DSW category. The frequency was, by and large, similar among the Dibongiya Deori males (145) which were 19.31%, 76.55% and 4.13% respectively.

With regard to educational qualification, the maximum frequency is seen in the secondary and above educational level category, 80% in Thengal Kachari and 82.07% in Dibongiya Deori. Considering both the populations, only 8.08% are illiterate among them. The Chi-square values show non-significant differences between Thengal Kachari and Dibongiya Deori in terms of age group (χ^2 =4.88, df=2, p<0.05), marital status (χ^2 =0.16, df=2, p<0.05) and educational level (χ^2 =2.94, df=2, p<0.05).

With respect to the income level, it is seen that almost 49.62% of both the study populations fall under the low-income which consist of 34.78% of Thengal Kachari (115) and 61.38% of Dibongiya Deori (145). Under the high-income category, the Thengal Kachari is 28.7% having the lowest percentage compared with middle and low-income group. Only 19.31% of the Dibongiya Deori males belong to high-income group respectively.

It is also evident with regard to the family size, the highest proportion of Thengal Kachari males (46.96%) belong to small sized families whereas the highest proportion of Dibongiya Deori males (46.21%) belongs to medium sized families. Evaluating the occupational background, the highest Thengal Kachari males (47.83%) are associated with some Government services and highest Dibongiya Deori (49.66%) are associated in others category which includes jobs like daily wage labour, business, animal husbandry, pensioners or dependents etc. There are statistically significant differences between Thengal Kachari and Dibongiya Deori with regards to income group (χ^2 =18.61, df=2, p<0.001), family size (χ^2 =12.70, df=2, p<0.01) and occupation (χ^2 =8.56, df=2, p<0.05) respectively.

Anthropometric characteristics

The test of significance using the t-test method among the Thengal Kachari and Dibongiya Deori men from anthropometric characteristics were shown in Table 2. There are statistically significant differences between Thengal Kachari and Dibongiya Deori with regards to weight

(t=2.00, p<0.05), waist circumference (t=2.89, p<0.01) and conicity index (t=2.53, p<0.05), Dibongiya Deori men show the larger values.

However, there are statistically non-insignificant differences with regard to stature, sitting height, mid-upper arm circumference, hip circumference, body mass index, cormic index, waist to hip ratio and waist to height ratio, the measurements are found to be more or less similar.

Prevalence of underweight and overweight according to anthropometric indices

The nutritional status according to Body Mass Index among the Thengal Kachari and Dibongiya Deori men were shown in Table 3. 58.08% of the total study population is found to be within the normal category. 10.77% and 31.15% of the total population belongs to underweight and overweight. With regard to Thengal Kachari population 13.04%, 56.52% and 30.44% belong to underweight, normal and overweight category respectively. On the other hand, 8.97%, 59.31% and 31.72% of the Dibongiya Deori males belong to underweight, normal and overweight category respectively. Comparing different categories of BMI between Thengal Kachari males and the Dibongiya Deori males, it is observed that the proportion of individuals in underweight is more among the Thengal Kachari males than the Dibongiya Deori males. However, the proportion of overweight, by and large, seems to be similar in both the study population.

Table 4 shows the prevalence of underweight according to anthropometric indices which reveals that there are statistically significant differences between Thengal Kachari and Dibongiya Deori with respect to conicity index (χ^2 =4.45, df=1, p<0.05) and waist to hip ratio (χ^2 =6.36, df=1, p<0.05). With regards to the conicity index, in lower (<1.26) conicity index category, Thengal Kachari shows larger values (9.57%) than Dibongiya Deori (4.14%). On the contrary, in higher ($\geq$1.26) conicity index, Thengal Kachari (3.48%) shows slightly smaller values than Dibongiya Deori (4.83%). Similarly with regards to waist-hip ratio, in lower (<0.92) waist-hip ratio category, Thengal Kachari males (11.30%) show larger values than Dibongiya Deori males (5.52%) but in higher ($\geq$0.92) waist-hip ratio category, Thengal Kachari males (1.73%) show smaller values than Dibongiya Deori males (3.45%). However, the chi-square shows statistical non significant difference in cormic index and waist to height ratio between Thengal Kachari and Dibongiya Deori males respectively.

Table 4 also shows the prevalence of overweight according to anthropometric indices. The chi-square values show the statistically non significant differences between Thengal Kachari and Dibongiya Deori males except for conicity index (χ^2 =4.47, df=1, p<0.05). It reveals that in lower (>1.26) conicity index category, Thengal Kachari shows larger values (19.13%) than Dibongiya Doeri (12.41%) whereas in higher (≤1.26) conicity index category, Thengal Kachari (12.41%) shows smaller proportion than Dibongiya Deori (19.31%).

Thus, in the prevalence of underweight and overweight according to anthropometric indices, the larger values of Thengal Kachari in the lower conicity index and lower waist to hip ratio may be because of the fact that the proportion of underweight is larger among the Thengal Kachari than the Dibongiya Deori.

Prevalence of underweight and overweight according to socioeconomic factors

The prevalence of underweight and overweight shows non-significant differences between Thengal Kachari and Dibongiya Deori adult males with regards to socioeconomic factors like age group, educational level, income group, family sizes and occupation. The chi-square value shows statistically significant differences between Thengal Kachari and Dibongiya Deori in the prevalence of underweight only in terms of marital status ($\chi2$ =18.57, df=2, p<0.0001) as observed in Table 5.

DISCUSSION

The present study indicates that 10.77%, 58.08% and 31.15% of the total study population belongs to underweight, normal and overweight category respectively. It is observed that the Dibongiya Deori males were heavier than the Thengal Kachari males. Similarly, the waist circumference also shows higher values among the Dibongiya Deori than the Thengal Kachari adults. The present study reveals that the proportion of subjects in underweight category seems to be higher among the Thengal Kachari males (13.04%) than the Dibongiya Deori (8.97 %.). In terms of anthropometric indices, the prevalence of underweight is more pronounced with regards to conicity index and waist to hip ratio. The present study reveals that the prevalence of underweight is more than the Meitei of Manipur (Singh, 2013), Sonowal Kachari (Dutta and Sengupta, 2008) and Pnar Khasi of Meghalaya   (Lalnuneng and Khongsdier, 2017) but lower than the Ao Naga of Nagaland (Temsutola, 2010), Tangkhul Naga of Manipur (Mungreiphy *et al.,* 2011) and War Khasi of Meghalaya (Khongsdier,2002).

The proportion of overweight, by and large, seems to be similar in both the Thengal Kachari (30.44%) and Dibongiya Deori (31.72%) population. The prevalence of overweight in respect of anthropometric indices is clearly perceptible only in terms of the conicity index in both the study population. According to WHO (2015), obesity has reached epidemic proportions globally with 39 per cent of adults (36.0 per cent of men) over the age of 18 years being overweight or obese in 2014. In developing countries including India, the situation is more complex, because the problem of CED still continues along with an emerging problem of overweight and obesity (Caballero, 2005; Mendez *et al.*, 2005; Caballero, 2007; Wang *et.al.,* 2009; WHO, 2014; WHO, 2015). Thus with regards to the prevalence of overweight, the present findings of both the population indicate that it is higher than the Meitei (Singh, 2013), Ao Naga (Temsutola, 2010), Tangkhul Naga (Mungreiphy *et. al.*, 2011) and War Khasi (Khongsdier, 2002) but reported to be lower than the Sonowal Kachari (Dutta and Sengupta, 2008) and the Pnar Khasi (Lalnuneng and Khongsdier, 2017) of Northeast India.

Although the economic condition of the Thengal Kachari is much better than the Dibongiya Deori, the prevalence of under-nutrition is high among the Thengal Kachari. It is generally accepted that high prevalence of undernutrition in the developing countries is attributed to poor socio-economic conditions, ethnic/population, socio-economic, demographic disparities, nutrient deficiencies and environmental issues in populations (Bhutta *et al.*, 2013; Tigga *et al.*, 2015; Menon *et al.*, 2018). The effect of socio-economic factors like marital status was clearly perceptible especially in terms of underweight in the present study population. The present findings of both the population are consistent with several studies that marriage is positively linked to body weight (Jeffrey & Rick, 2002; Meltzer & Everhart, 1995; Teachman, 2016). The findings indicate that the prevalence of underweight is higher among the married adult male in Thengal Kachari whereas, among the Dibongiya Deori, it is higher among the unmarried males. However, in the case of overweight, the prevalence is higher among married adult males in both the study population. Therefore, the present study is similar to Cobb *et al.,* (2016) which suggests that having a spouse nearly doubles one's risk of becoming obese or overweight.

CONCLUSION

The outcome of the present study provides us with a comprehensive database of the health and nutritional status as well as a glimpse of the physiological profile of two heterogeneous ethnic groups. The Thengal Kachari and the Dibongiya Deori population living in the same

geographical conditions have very close relations with each other which have not been hitherto documented before.

Limitation of the present study includes an inadequate sample size on adult males of both the population which hopes that future studies will pay more attention to an analytical aspect of nutritional status of males in Northeast India. However, the results of the present study may be helpful to formulate any appropriate intervention programs and strategies as an assessment of nutritional status is considered as a measure of health and it is necessary for planners to understand the nutritional situation among the tribal population for the upliftment of these vulnerable groups.

The present study revealed that the population is facing a double burden of the nutritional problem within individuals, households and populations, and across the life-course poses a real and growing global health challenge as reported in populations throughout the developing world (Lewis and MacPherson, 2012; Pampel *et al.,*2012). To overcome this problem, there is an immediate requirement for appropriate steps to be taken to improve the nutritional status of these groups on the basis of the severity of the burden they are facing

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REFERENCES

Adak D, Gautam R, Bharat S, Gharami AK, Pal M, Bharati P. 2006. Body Mass Index and chronic energy deficiency of adult male of Central Indian Populations. Hum Biol 78: 161-178.

Banik SD, Bose K, Bisai S. 2005. Anthropometric and Physiometric Assessment of Adult Dhimals of Naxalbari, West Bengal. Ind J Biol Sci 11: 26-39.

Banik SD. 2007. Age-Sex and Diurnal Variation of Blood Pressure in Different Nutritional States among the Adult Telegas of Kharagpur in West Bengal, India. Coll Antropol 31: 717-722.

Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, Webb P, Lartey A, Black RE, Lancet Nutrition Interventions Review Group, the Maternal and Child Nutrition Study Group. 2013. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? Lancet 382: 452-477.

Caballero B. 2005. A nutrition paradox: Underweight and obesity in developing countries. N Engl J Med 352: 1514-1516.

Caballero B. 2007. The global epidemic of obesity: An overview. Epidemiol Rev 29: 1-5.

Chiu HC, Chang HY, Mau LW, Lee TK, Liu HW. 2000. Height, weight, and body mass index of elderly persons in Taiwan. J Gerontol A Biol Sci Med Sci 55: 684-690.

Cobb LK, McAdams-DeMarco MA, Gudzune KA, Anderson CAM, Demerath E, Woodward M, Selvin E, Coresh J. 2016. Changes in Body Mass Index and Obesity Risk in Married Couples Over 25 Years: The ARIC Cohort Study. Am J Epidemiol 183: 435-443.

Dutta D, Sengupta S. 2008. Prevalence of Overweight and Obesity among three ethnic groups of Assam: A Preliminary Appraisal. Bull. Deptt Anthrop Dib Univ 36: 1-16.

International Institute for Population Sciences (IIPS) and ICF. 2017. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS.

Jaiswal A. 2018. Nutritional and Health Status Evaluation of Tribes of Uttar Pradesh: An Anthropological Dimension. Glob J Arch & Anthropol 6: 001-006.

Jeffrey R, Rick A. 2002. Cross-sectional and longitudinal associations between body mass index and marriage-related factors. Obes Res 10:809-815.

Kapoor S, Chaturvedi KT, Kapoor AK. 2009. Nutritional profile and socio-economic status of Saharia: A primitive tribe of India. Open Anthropol J 2: 58-63.

Khongsdier R. 2002. Body mass index and morbidity in adult males of the War Khasi in Northeast India. Eur J Clin Nutr 56: 484-489.

Kikafunda JK, Lukwago FB. 2005. Nutritional status and functional ability of the elderly aged 60 to 90 years in the Mpigi district of central Uganda. Nutrition 21: 59-66.

Lalnuneng A, Khongsdier R. 2017. The Effects of the Interaction of Household Income with Age and Sex on BMI among the Pnars of Nangbah Village in Jaintia Hills of Meghalaya. In: Khongsdier R, Sengupta S, editors. People of North East India: Bio-Cultural Dimensions. Kalpaz Publications. Delhi. p123-133.

Lewis MJ, MacPherson KL. 2012. Health Transitions and the Double Disease Burden in Asia and the Pacific. Routledge, London.

McLorg PA. 2005. Anthropometric patterns in middle-aged and older rural Yucatec Maya women. Ann Hum Biol 32: 487-497.

Meltzer A, Everhart J. 1995. Self-reported substantial 1-year weight change among men and women in the United States. Obes Res 3:123–134.

Melvin WH. 2006. Nutrition for Health, Fitness and Sport. 7th edition, Mc Graw-Hill, New York.

Mendez MA, Monteiro CA, Popkin BM. 2005. Overweight exceeds underweight among women in most developing countries. Am J Clin Nutr 81: 714-721.

Menon P, Headey D, Avula R, Nguyen PH. 2018. Understanding the geographical burden of stunting in India: A regression-decomposition analysis of district-level data from 2015- 16. Matern Child Nutr 14: e12620.

Mungreiphy NK, Kapoor S, Sinha R. 2011. Association between BMI, Blood pressure and Age: Study among Thangkhul Naga Tribal males of North East India. J Anthropol 2011: 748147

Pampel FC, Denney JT, Krueger PM. 2012. Obesity, SES and Economic Development: A test of the reversal hypothesis. Soc Sci Med 74:1073-1081.

Singh MS. 2013. Obesity and Self-reported morbidity in relation to lifestyle and diet among the Meitei of Manipur. Unpublished PhD thesis. Department of Anthropology. The North Eastern Hill University. Shillong.

Strickland SS, Ulijaszek SJ.1993. Body mass index, ageing and differential reported morbidity in rural Sarawak. Eur J Clin Nutr 47: 9-19.

Teachman J.2016. Body Weight, Marital Status, and Changes in Marital Status. J Fam Issues 37: 74-96.

Temsutola. 2010. Body Composition among the Ao adults. Unpublished PhD thesis. Department of Anthropology. The North Eastern Hill University. Shillong.

Tigga PL, Sen J, Mondal N. 2015. Association of some socio-economic and socio-Demographic variables with wasting among pre-school children of north Bengal, India. Ethiop J Health Sci 25:63-72.

Wang Y. Chen HJ, Shaikh S, Mathur P. 2009. Is obesity becoming a public health problem in India? Examine the shift from under to overnutrition problems over time. Obes Rev 10: 456-474.

Weiner, J. S. and Lourie, J. A. 1981. Practical Human Biology. London: Academic Press.

World Health Organization (WHO) .2000.The Asia Pacific Perspective: Redefining obesity and its treatment. Geneva.

World Health Organization (WHO). 2014. Global Status Report on Non-Communicable Diseases 2014. World Health Organization, Geneva.

World Health Organization (WHO). 2015. World Health Statistics 2015. World Health Organization, Geneva.

World Health Organization (WHO). 2017. The Double burden of malnutrition; Brief Policy. World Health Organization, Geneva.

Table 1: Percentage distribution of Thengal Kachari and Dibongiya Deori by socioeconomic background

Socioeconomic background	Thengal Kachari N=115		Dibongiya Deori N=145		Total N=260	
	No.	%	No.	%	No.	%
Age group (years)						
≤ 34	56	48.70	53	36.55	109	41.92
35 – 54	37	32.17	65	44.83	102	39.23
≥ 55	22	19.13	27	18.62	49	18.85
χ^2 value with df 2	4.55					
Marital Status						
Unmarried	24	20.87	28	19.31	52	20.00
Married	87	75.65	111	76.55	198	76.15
DSW*	4	3.47	6	4.13	10	3.77
χ^2 value with df 2	0.16					
Education						
Illiterate	7	6.09	14	9.66	21	8.08
Primary	16	13.91	12	8.27	28	10.77
Secondary and above	92	80.00	119	82.07	211	81.15
χ^2 value with df 2	2.94					
Income group						
Low	40	34.78	89	61.38	129	49.62
Middle	42	36.52	28	19.31	70	26.92
High	33	28.70	28	19.31	61	23.46
χ^2 value with df 2	18.6***					
Family size						
Small (≤4 members)	54	46.96	38	26.21	92	35.39
Medium (5- 7 members)	42	36.52	67	46.21	109	41.92
Large (≥8 members)	19	16.52	40	27.58	59	22.69
χ^2 value with df 2	12.70**					
Occupation						
Agriculture	11	9.56	27	18.62	38	14.61
Govt. Services	55	47.83	46	31.72	101	38.85
Others	49	42.61	72	49.66	121	46.54
χ^2 value with df 2	8.56*					

*D=Divorce, S=separate and W=widower

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

Table 2: t-value of the Thengal Kachari and Dibongiya Deori adult males by anthropometric characteristics

Anthropometric measurements	Thengal Kachari		Dibongiya Deori		t-value
	Mean	SD	Mean	SD	
Weight (kg)	57	8.51	59.18	8.93	2.00*
Stature (cm)	163.55	5.23	163.62	5.07	0.11
Sitting Height (cm)	86.11	3.77	86.06	2.74	0.12
Waist Circumference (cm)	76.87	8.40	83	8.90	2.90**
Hip Circumference (cm)	88.70	5.52	89.11	5.90	0.58
BMI (kg/m^2)	21.51	2.87	21.90	2.98	1.07
Conicity index	1.24	0.08	1.27	0.08	2.52*
Cormic index	0.53	0.02	0.53	0.02	0.87
Waist to hip ratio	0.91	0.06	0.92	0.06	1.76
Waist to height ratio	0.50	0.05	0.50	0.05	0.89

*$p<0.05$, **$p<0.01$

Table 3: Nutritional status of the Thengal Kachari and Dibongiya Deori adult males according to BMI

Nutritional status	Thengal Kachari N=115		Dibongiya Deori N=145		Total N=260	
	No.	%	No.	%	No.	%
Underweight (<18.5)	15	13.04	13	8.97	28	10.77
Normal (18.5-22.9)	65	56.52	86	59.31	151	58.08
Overweight (≥23.0)	35	30.44	46	31.72	81	31.15

Table 4: Prevalence of underweight and overweight according to Anthropometric Indices

Anthropometric Indices	Underweight		Overweight	
	Thengal Kachari N=115	Dibongiya Deori N=145	Thengal Kachari N=115	Dibongiya Deori N=145
Cormic index <0.53 (Lower) ≥0.53 (Higher)	9 (7.83) 6 (5.22)	10 (6.90) 3 (2.07)	14 (12.17) 21 (18.26)	18 (12.41) 28 (19.26)
χ^2 value with df 1	0.01		0.91	
Conicity index <1.26 (Lower) ≥1.26 (Higher)	11 (9.57) 4 (3.48)	6 (4.14) 7 (4.83)	22 (19.13) 13 (11.30)	18 (12.41) 28 (19.31)
χ^2 value with df 1	4.45*		4.47*	
Waist Hip Ratio <0.92 (Lower) ≥0.92 (Higher)	13 (11.30) 2 (1.73)	8 (5.52) 5 (3.45)	14 (12.17) 21 (18.26)	7 (4.83) 39 (26.90)
χ^2 value with df 1	6.36*		2.35	
Waist Height ratio <0.50 (Lower) ≥0.50 (Higher)	9 (7.83) 6 (5.22)	8 (5.22) 5 (3.45)	14 (12.17) 21 (18.26)	19 (13.10) 27 (18.62)
χ^2 value with df 1	0.01		0.01	

Figures within parentheses indicate percentages.

p<0.05*

Table 5: Prevalence of underweight and overweight according to socioeconomic factors

Socioeconomic Factors	Underweight		Overweight	
	Thengal Kachari N=115	Dibongiya Deori N=145	Thengal Kachari N=115	Dibongiya Deori N=145
Age group (years)				
<34	5 (4.35)	2 (1.38)	21 (18.26)	17 (11.72)
35 – 54	5 (4.35)	7 (4.83)	12 (10.43)	22 (15.17)
>55	5 (4.35)	4 (2.77)	2 (1.74)	7 (4.83)
χ^2 value with df 2	1.60		4.73	
Marital Status				
Unmarried	1 (0.87)	11 (7.58)	10 (8.70)	8 (5.52)
Married	13 (11.30)	1 (0.69)	24 (20.87)	37 (25.51)
DSW	1 (0.87)	1 (0.69)	1 (0.87)	1 (0.69)
χ^2 value with df 2	18.57 *		1.53	
Educational level				
Illiterate	1 (0.87)	1 (0.69)	1 (0.87)	4 (2.76)
Primary	3 (2.61)	3 (2.07)	1 (0.87)	1 (0.69)
Secondary and above	11 (9.57)	9 (6.21)	33 (28.70)	41 (28.28)
χ^2 value with df 2	0.06		1.19	
Income Group				
Low	8 (6.97)	10 (6.90)	11 (9.57)	22 (15.17)
Middle	5 (4.35)	2 (1.38)	14 (12.17)	13 (8.97)
High	2 (1.74)	1 (0.69)	10 (8.70)	11 (7.59)
χ^2 value with df 2	1.71		2.30	
Family Size				
Small	7 (6.09)	3 (2.07)	14 (12.17)	14 (9.66)
Medium	4 (3.48)	3 (2.07)	16 (13.31)	22 (15.17)
High	4 (3.48)	7 (4.83)	5 (4.35)	10 (6.90)
χ^2 value with df 2	2.42		1.14	
Occupation				
Agriculture	8 (6.96)	3 (2.07)	4 (3.48)	11 (7.59)
Govt Servant	5 (4.35)	3 (2.07)	12 (10.43)	14 (9.67)
Others	4 (3.48)	7 (4.83)	19 (16.52)	21 (14.48)
χ^2 value with df 2	5.44		2.06	

Figures within parentheses indicate percentages.

p<0.0001*