

## Prevalence of Overweight and Obesity among Meitei and Ao Naga Adolescents

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**KEYWORDS** BMI. Manipur. Nagaland. Socio-economic. Urban

**ABSTRACT** The present study was conducted among Meitei and Ao Naga adolescent boys of Manipur and Nagaland respectively. A cross-sectional data was collected on 256 Meitei adolescent boys and 188 Naga adolescent boys aged 14-18 years from the urban areas of Imphal and Mokokchung respectively. Body mass index (BMI) for each subject was calculated. Prevalence of overweight and obesity was evaluated using the international cut off point. The prevalence of overweight (3.51%) and obesity (1.59%) was found to be higher among Meitei adolescent boys. The possible reason could be the difference in urban settings, geographical locations and socio-economic development. The other possible reasons could be explained by changing lifestyles, physical activities and patterns of food habits adopted by these two populations.

### INTRODUCTION

Obesity is caused by chronic quantitative imbalance between the energy intake and energy expenditure leading to excessive accumulation of adipose tissue within the body (Bray and Bellanger 2006). Globally, obesity is growing rapidly with around 43 million children under age five found to be overweight (WHO 2011) and 10 percent of school-aged children between 5 to 17 years of age overweight or obese (Bharati et al. 2008). WHO (2003) has also declared overweight as one of the top 10 health risks in the world, while it is ranked in the top five of those in developed countries. In developing countries, with India being one of them, proportion of overweight and obese people now co-exist with those who are undernourished (Popkin 2002). Several studies have demonstrated that the higher childhood body mass index, the greater the risk of becoming an overweight adult with the risk being heightened in adolescence (Hwalla 2005).

Over the past two decades, the prevalence of overweight and obesity has increased in both developed and developing countries (Doll et al. 2002). For instance, the prevalence of obese school children was 20% in UK, 15.8% in Saudi Arabia, 15.6% in Thailand, 10% in Japan and 7.8%

in Iran (Mo-Suwan et al. 1993; Al-Nuaim et al. 1996). In England, obesity in children and adolescents of all ethnicities has increased nearly two times over the past 10 years (Matijasevich et al. 2009). Within India, studies from Delhi and Chennai have shown that the prevalence of obesity was about 7% and 6% respectively (Kapil et al. 2002; Subramanyam et al. 2003). This increasing tendency of overweight and obesity is now causing concern in societies and among the health care providers. Little or no research has been done on the prevalence of overweight and obesity among Meitei and Ao Naga adolescent boys so far, hence the present study was conducted in these two districts viz. Imphal and Mokokchung districts.

### Objective

The primary purpose of this study was to determine the prevalence of overweight and obesity among Meitei and Ao Naga adolescent boys of Manipur and Nagaland respectively.

### MATERIAL AND METHODS

The present study was conducted among the adolescent boys of Meitei and Ao Naga of Manipur and Nagaland respectively. No such comparative study between these two groups had been done so far. A cross sectional data was collected on 256 Meitei and 188 Ao Naga adolescent boys aged 14-18 years from the urban areas of Imphal and Mokokchung respectively. The

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data collection was carried out during November 2009 to August 2010 among Meitei adolescent boys and January 2010 to February 2011 among Ao Naga adolescent boys. Imphal is the main commercial hub and capital city of Manipur state, and Meitei mostly populates this area. Mokokchung, on the other hand, is the District headquarter located at around 160 kms distance from Kohima, capital of Nagaland. The Ao Nagas are a major tribe found in the north-eastern part of Nagaland, mostly in central Mokokchung District. Both Meitei and Ao Naga population follow the patrilineal system of society. The data from each subject were collected randomly following house to house visit. An anthropometer and a weighing scale to the nearest of 0.1 cm and 0.5 kg respectively was used to measure height and weight (Lohman et al. 1988). The parameters taken were analyzed statistically to find out the mean and standard deviation. In order to test the level of significance, both t-test and chi-square test have been used. The value of  $p < 0.05$  and  $p < 0.01$  were considered statistically significant. The presence of overweight and obesity have been evaluated using the International cut off points for children and adolescent by age and sex according to BMI (Cole et al. 2000). MS-Excel software was used for all statistical analyses of the present research.

## RESULTS

The mean, standard deviation and t-value with the level of significance of height and body weight between the different age groups for both Meitei and Ao Naga adolescent boys are given in Tables 1 and 2. An increasing trend in mean height with advancing age was noticed in both the populations. The lowest mean height (154.05cm) was found more or less the same in both Meitei and Ao Naga adolescent boys at 14 years of age. And the highest mean height (165.17cm) among Ao Naga adolescent boys and highest mean height (163.93cm) among Meitei adolescent boys were reported at 18 years of age. The distributions of mean heights were found to be significant till 16 and 15 years of age in Meitei and Ao Naga adolescent boys respectively.

Furthermore, the mean body weight also increased along with the increase in age in both the populations. Meitei adolescent boys showed higher mean body weight than Ao Naga adolescent boys in all the age groups. The mean body weight among Meitei (48.25 kg) and Ao Naga adolescent boys (42.18%) was observed lowest at 14 years of age, and the highest weight at 18 years of age in both Meitei (55.76 kg) and Ao Naga adolescent boys (54.07%). The difference

**Table1: Basic data on height and body weight among Meitei adolescent (boys)**

Age	N	Height (Centimeter)				Weight (Kilogram)			
		Mean	± SD	t test	t level	Mean	± SD	t test	t level
14	40	154.56	8.00			48.25	6.68		
15	42	158.07	6.78	2.13	p<0.05	51.64	5.68	2.47	p<0.05
16	41	162.51	6.63	3.01	p<0.01	54.18	5.84	2.01	p<0.05
17	42	162.72	6.74	0.14	ns	54.12	5.02	0.05	ns
18	45	163.93	5.65	0.89	ns	55.76	5.76	1.42	ns

N= total number of subjects, SD=standard deviation

**Table2: Basic data on height and body weight among Ao Naga adolescent (boys)**

Age	N	Height (Centimeter)				Weight (Kilogram)			
		Mean	± SD	t test	t level	Mean	± SD	t test	t level
14	38	154.05	7.55			42.18	7.33		
15	35	161.15	5.05	4.75	p<0.05	48.77	7.47	3.80	p<0.05
16	39	161.26	3.57	0.11	ns	49.03	4.74	0.17	ns
17	35	162.67	5.22	1.34	ns	50.91	5.02	1.66	ns
18	41	165.17	5.99	1.94	ns	54.07	6.68	2.35	p<0.05

N= total number of subjects, SD=standard deviation

**Table 3: Age-wise distribution of overweight and obesity among Meitei and Ao Naga adolescent boys(International reference from Cole et al. 2000)**

Age	Meitei adolescent boys			Naga adolescent boys		
	N	Overweight	Obese	N	Overweight	Obese
14	40	4 (10.00%)	1 (2.50%)	38	-	-
15	42	2 (4.76%)	1 (2.38%)	35	2 (5.71%)	-
16	41	1 (2.44%)	-	39	-	-
17	42	1 (2.38%)	-	35	-	-
18	45	1 (2.22%)	-	41	1 (2.44%)	-

N= total number of subjects

was found to be significant till 16 years of age among Meitei adolescent boys, while in the case of Ao Naga adolescent boys, it was found to be significant at 14-15 and 17-18 years and insignificant at 15-16 and 16-17 years of age groups.

The prevalence of overweight and obesity according to Cole et al.'s (2000) international cut off points are given in Table 3. This table shows that the highest prevalence of overweight (10.00%) was found at 14 years of age among Meitei adolescent boys, whereas, overweight (5.71%) was found to be highest at 15 years of age among the Ao Naga adolescent boys. The frequency of obesity (2.50%) was reported more or less the same among Meitei adolescent boys at 14 and 15 years of age. The occurrence of overweight (2.44%) at 18 year of age was also found more or less the same between Meitei and Ao Naga adolescent boys. The comparison between these two different populations on the prevalence of overweight and obesity showed that Meitei adolescent boys had higher percentage in all the age groups except at 15 years, whereas, Ao Naga adolescent boys reported slightly higher prevalence of overweight.

The overall distribution of overweight and obesity for both the populations are given in Table 4. This table indicates that the prevalence of both overweight (3.51%) and obesity (0.78%) were found to be higher among Meitei adoles-

cent boys than Ao Naga adolescent boys, where, the prevalence of overweight was 1.59percent. The differences were statistically not significant ( $\chi^2=0.64$ ,  $df=1$ ,  $p>0.05$ ).

## DISCUSSION

The present study shows that the mean height and mean body weight increased along with the increase in age group in both Meitei and Ao Naga adolescents. The increase in height and body weight in both the populations could be due to overall development on the socio-economic conditions and better nutrition that occurred since the last few decades as a result of modernization, urbanization and globalization.

With rapid socio-economic development, coupled by a changing lifestyle, which is increasingly sedentary, populations of both developed and developing countries are facing rapid increases in the prevalence of overweight and obesity among children and adolescents (Popkin 2002). The present study shows differences in the prevalence of overweight and obesity in both the populations with higher occurrence among Meitei adolescent boys almost in all the age groups. The differences in the occurrence of overweight and obesity could be explained by the differences in their urban setting, geographical location, socio-economic development, changing lifestyles including physical activities and patterns of food habits. The other possible reason could be the area selected and sample size included in the present study. Several studies have mentioned that the patterns of overweight and obesity differed by difference in socio-economic conditions, selection of sample and area selected (Matijaasevich et al. 2009; Kotian et al. 2010). A study by Dkhar and Singh (2012) also mentioned the changing food environments as one of the factor for increasing prevalence of

**Table 4: Overall distribution of overweight and obesity among Meitei and Ao Naga adolescent boys (14-18 years)**

Population	N	Overweight	Obese
Meitei adolescent boys	256	9 (3.51%)	2 (0.78%)
Ao Naga adolescent boys	188	3 (1.59%)	-

$\chi^2=0.64$ ,  $df=1$ ,  $p>0.05$

overweight and obesity among Meitei adolescents in Manipur. Therefore, in this globalised era with the ever changing lifestyles with a more sedentary living accompanied by changes in food habits, societies should be aware of the different obesity related health problems and economic costs of obesity.

### CONCLUSION

In conclusion, the present study highlights the prevalence of overweight/obesity among the Meitei and Ao Naga adolescents. Prevention should begin early in life in childhood and adolescence to check the increasing problems and its health consequences. Furthermore, health education programs and effective policies are urgently required to promote healthy eating and physical activity from early childhood period.

### ACKNOWLEDGEMENTS

The authors are very thankful to all the subjects under study for their cooperation and patience during the time of fieldwork. M.S.Singh is grateful to University Grant Commission for providing financial assistant through UGC-JRF Fellowship. Temsumongla is also very thankful to UGC for granting financial assistant through UGC-Rajiv Gandhi Fellowship. We are also very thankful to our supervisor Dr.J.W.Dkhar for his support and help rendered.

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