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Commentary

Obesity & abdominal obesity in Asian Indians

Obesity identified as a nutritional disorder, thirty years ago[1], still continues to be one of the most important, yet preventable health hazards. Indeed, obesity rates have now reached epidemic proportions with over 25 per cent of the population being obese in US and 15 per cent in Europe[2].

Obesity is considered to be the link between insulin resistance and metabolic abnormalities inclusive of diabetes, hypertension and dyslipidaemia, all of which are risk factors for coronary artery disease. In the recent INTERHEART study, abdominal obesity assessed by waist-to-hip ratio showed a strong association with myocardial infarction[3]. Obesity is also considered to be a major risk factor for hypertension[4]. Over 70 per cent of hypertension among males and 61 per cent among females was attributed to excess adiposity in the Framingham study[5]. The INTERSALT study also showed a strong association between body mass index and blood pressure[6]. In a population based study conducted in Chennai, subjects with hypertension had increased body mass index (BMI) and waist circumference compared to normotensives[7]. The study by Deshmukh *et al*[8] in this issue suggests that there is a significant correlation between obesity indices and systolic and diastolic blood pressure. In their study, body mass index is found to be better correlated with blood pressure than waist measurements. This may be because, the population was unusually lean, being a rural population.

Obesity has now become an important health problem in developing countries particularly in India, which is currently experiencing a rapid epidemiological transition. The epidemiological transition has its positive side in that it has resulted in an increased life expectancy and a decrease in infant mortality rates and deaths due to infectious causes. However, the consequences of industrialization and urbanization which lead to rise in standards of living, also promote weight gain and obesity rates begin to rapidly rise thus posing a growing threat to the health of the nation. There is a paucity of nation wide data on the prevalence of obesity in India. However, studies from different States of India provide some clues regarding the health threat due to this problem. Available data on prevalence of obesity from different published studies[8,9-15] suggest that the prevalence ranged from 10 to 50 per cent (Table). Undoubtedly, these large differences in prevalence rates are due to differences in methodology and the definitions and cut-off points used for defining obesity.

Measures commonly used for assessing obesity are BMI and waist circumference (WC). Unfortunately, BMI is not considered to be a good estimate of obesity in Asian Indians as they have a characteristic obesity phenotype, with relatively lower BMI but with central obesity. It has been suggested that fat distributed in the abdominal region, particularly visceral fat is more metabolically important than other fat depots. Case control studies[16], have clearly indicated that visceral fat is

Table. Prevalence of obesity in India

Author	City/ Centre	Year	Age (yr)	No. of subjects studied	Prevalence of obesity (%)	
					Male	Female
Dhurandhar & Kulkarni[9]	Bombay	1992	31 - 50	1784	10.7 - 53.1	-
Gopinath *et al*[10]	Delhi	1994	25 - 64	13414	21.3	33.4
Zargar *et al*[11]	Kashmir	2000	>40	5083	7.0	23.7
Gopalan[12]	Nutrition Foundation of India	1998	-	Upper strata	32.2	50
				Middle class	16.2	30.3
				Low socio-economic group	7.0	27.8
				Poor urban slum	1.0	4.0
District nutrition profiles survey[13]	Food and Nutrition Board	1998	-	Rural (n = 142220)	0.3	0.7
				Urban (n = 35621)	0.4	0.7
National family health survey[14]	-	1998-99	15 - 49	-	-	2.3
Mohan *et al*[15]	Chennai urban population study	2001	>20	1262 obesity	22.8	31.8
				Abdominal obesity	21.5	36.5
Deshmukh *et al*[8]	Rural Wardha	2006	>18	2700 obesity	5.1	5.2
				Abdominal obesity	7.6	8.7

associated with diabetes. Hence abdominal adiposity assessed using waist circumference is considered to be more appropriate to predict metabolic disorders than generalized adiposity assessed by BMI.

Several reports suggest that for any given BMI, Indians tend to have increased waist circumference[17]. Further, Indians also tend to have excess body fat, abdominal and truncal adiposity. For any given waist circumference, they have increased body fat accumulation and for any given body fat, they have increased insulin resistance[17,18]. These features have been referred to as the "Asian Indian Phenotype or Paradox"[19]. The World Health Organization has revised the BMI cut-off for Asain Indians and suggested a BMI of 25 kg/m^2 to define obesity against the 30 kg/m^2 recommended for Europeans[20]. Further, due to these ethnic differences in obesity assessment, the International Federation of Diabetes[21] has modified the diagnosis of metabolic syndrome using ethnic specific cut offs for waist circumference.

Several studies from India have attempted to modify the threshold for obesity and abdominal obesity using various metabolic abnormalites as gold standard[22-25]. These studies have suggested cut-offs for BMI ranging from 19-22 kg/m^2 while that of waist circumfernce ranges from 72-85 cm in men and 65.5 - 80 cm in women[8,22-25]. The study done by Deshmukh *et al*[8] is an attempt to identify obesity thresholds in rural Wardha. This study indicates that the threshold for all obesity parameters namely BMI, WC and WHR is remarkably low in rural Wardha compared to other studies in India. This indicates a geographical variation in obesity parameters and its association with metabolic abnormalites. Such regional variations have also been documented in the prevalence of diabetes and coronary artery disease[26].

This study[8] and that of others from India[22-25] indicate the need for a national level study on obesity indices to determine the thresholds for obesity parameters for detecting high risk groups for metabolic abnormalities. This can help in formualting prevention strategies, as studies in the West have demonstrated that weight reduction can delay the onset of diabetes[27].

V. Mohan* & R. Deepa
Madras Diabetes Research Foundation &
Dr Mohan's Diabetes Specialities Centre
4, Conran Smith Road, Gopalapuram
Chennai 600086, India
**Corresponding author*
e-mail: drmohans@vsnl.net

References

1. Infant and adult obesity. *Lancet* 1974; *1* : 17-8.

2. Chopra M, Galbraith S, Darnton-Hill I. A global response to a global problem: the epidemic of overnutrition. *Bull World Health Organ* 2002; *80* : 952-8.

3. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al*. INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet* 2004; *364* : 937-52.

4. Schorr U, Blaschke K, Turan S, Distler A, Sharma AM. Relationship between angiotensinogen, leptin and blood pressure levels in young normotensive men. *J Hypertens* 1998; *16* : 1475-80.

5. Kannel WB, Garrison RJ, Dannenberg AL. Secular blood pressure trends in normotensive persons: the Framingham Study. *Am Heart J* 1993; *125* : 1154-8.

6. Stamler R, Shipley M, Elliott P, Dyer A, Sans S, Stamler J. Higher blood pressure in adults with less education. Some explanations from INTERSALT. *Hypertension* 1992; *19* : 237-41.

7. Shanthirani CS, Pradeepa R, Deepa R, Premalatha G, Raghavan S, Mohan V. Prevalence and risk factors for hypertension in a selected South Indian Population - The Chennai Urban Population Study. *J Assoc Physicians India* 2003; *51* : 20-7.

8. Deshmukh PR, Gupta SS, Dongre AR, Bharambe MS, Maliye C, Kaur S, *et al*. Relationship of anthropometric indicators with blood pressure levels in rural Wardha. *Indian J Med Res* 2006; *123* : 657-64.

9. Dhurandhar NV, Kulkarni PR. Prevalence of obesity in Bombay. *Int J Obes Relat Metab Disord* 1992; *16* : 367-75.

10. Gopinath N, Chadha SL, Jain P, Shekhawat S, Tandon R. An epidemiological study of obesity in adults in the urban population of Delhi. *J Assoc Physicians India* 1994; *42* : 212-5.

11. Zargar AH, Masoodi SR, Laway BA, Khan AK, Wani AI, Bashir MI, *et al*. Prevalence of obesity in adults - an epidemiological study from Kashmir Valley of Indian Subcontinent. *J Assoc Physicians India* 2000; *48* : 1170-4.

12. Gopalan C. Obesity in the urban middle class. *NFI Bull* 1998; *19* : 1-4.

13. Government of India. *India nutrition profile*. New Delhi: Department of Women and Child Development, Ministry of Human Resources, Government of India; 1998.

14. Agrawal P, Mishra V. Covariates of overweight and obesity of women in north India. *Population and Health Science* 116, 2004. *http://www.eastwestcenter.org/stored/pdfs/POPwp116.pdf* accessed on May 2, 2006.

15. Mohan V, Shanthirani S, Deepa R, Premalatha G, Sastry NG, Saroja R. Intra urban differences in the prevalence of the metabolic syndrome in southern India-The Chennai Urban Population Study (CUPS-4). *Diabet Med* 2001; *18* : 280-7.

16. Anjana M, Sandeep S, Deepa R, Vimaleswaran KS, Farooq S, Mohan V. Visceral and central abdominal fat and anthropometry in relation to diabetes in Asian Indians. *Diabetes Care* 2004; *27* : 2948-53.

17. Ramachandran A, Snehalatha C, Viswanathan V, Viswanathan M, Haffner SM. Risk of noninsulin dependent

diabetes mellitus conferred by obesity and central adiposity in different ethnic groups: a comparative analysis between Asian Indians, Mexican Americans and Whites. *Diabetes Res Clin Pract* 1997; *36* : 121-5.

18. Chandalia M, Abate N, Garg A, Stray-Gundersen J, Grundy SM. Relationship between generalized and upper body obesity to insulin resistance in Asian Indian men. *J Clin Endocrinol Metab* 1999; *84* : 2329-35.

19. Joshi SR. Metabolic syndrome – Emerging clusters of the Indian Phenotype. *J Assoc Physicians India* 2003; *51* : 445-6.

20. The Asia Pacific perspective: Redefining obesity and its treatment. Regional Office for the Western Pacific of the World Health Organization. World Health Organization, International Association for the Study of Obesity and International Obesity Task Force. Health Communications Australia Pty Limited, St Leonards, Australia; 2000 p. 22-9.

21. International Diabetes Federation (2005). New IDF worldwide definition of the metabolic syndrome. Press conference, 1st International Congress on "Pre-diabetes" and the metabolic syndrome. Berlin, Germany. April 14, 2005 (*www.idf.org*).

22. Misra A, Wasir JS, Vikram NK. Waist circumference criteria for the diagnosis of abdominal obesity are not applicable uniformly to all populations and ethnic groups. *Nutrition* 2005; *21* : 969-76.

23. Bhansali A, Nagaprasad G, Agarwal A, Dutta P, Bhadada S. Does body mass index predict overweight in native Asian Indians? A study from a North Indian population. *Ann Nutr Metab* 2006; *50* : 66-73.

24. Snehalatha C, Viswanathan V, Ramachandran A. Cutoff values for normal anthropometric variables in Asian Indian adults. *Diabetes Care* 2003; *26* : 1380-4.

25. Misra A, Vikram NK, Gupta R, Pandey RM, Wasir JS, Gupta VP. Waist circumference cutoff points and action levels for Asian Indians for identification of abdominal obesity. *Int J Obes (Lond)* 2006; *30* : 106-11.

26. Ramachandran A, Snehalatha C, Kapur A, Vijay V, Mohan V, Das AK, *et al*. Diabetes Epidemiology Study Group in India (DESI). High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. *Diabetologia* 2001; *44* : 1094-101.

27. Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, *et al*. Finnish Diabetes Prevention Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 2001 ; *344* : 1343-50.