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Changing Perspectives of Tribal Health in the Context of Increasing Lifestyle Diseases in India

Research Article

Gautam Kumar Kshatriya

Department Of Anthropology, University Of Delhi, Delhi 110007, India

***Corresponding author:** Gautam Kumar Kshatriya, Department Of Anthropology, University Of Delhi, Delhi 110007, India, E-mail: g26_51@yahoo.co.in

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Abstract

The total Scheduled Tribe population of India stands at 104,281,034 as per 2011 census and accounts for 8.6 per cent of the total population of the country. In spite of the concerted efforts by the Government of India, the tribal population groups are lagging behind Indian National population in most of the demographic and social and economic indicators. Similarly, a large number of these tribal groups also show prevailing dismal health conditions. The major focus of various studies related to health issues among tribal populations of India has been on malnutrition or under nutrition. Like all other developing countries, large scale urbanization/modernization has been taking place in India with effective changes in the lifestyles leading to appreciable increase in the prevalence of chronic metabolic conditions like cardio vascular diseases (CVD), diabetes, metabolic syndromes. The benefits of development in education, health and income generation have resulted in a significant amount of mainstreaming of Indian tribes. A number of tribal groups are capitalizing on economic opportunities that are available to them, with a desire to acquiring a better life style with modern life comforts. And thus many of the tribal populations of India are becoming susceptible to various metabolic risk factors that may be related to their dietary profile and physical activity. Therefore, it is worth investigating the changing perspectives of health among the tribes of India in the context of increasing life style disease in India. Precisely for this reason present paper highlights not only the prevalence of under nutrition and malnutrition among the Indian tribes, but, also tries to implicate the association of age, sex and Body Mass Index (BMI) with the different metabolic health risk factors using data among six tribes in Birbhum district of West Bengal and Mayurbhanj district of Odisha, India. Results of the present study indicate that young tribal males are showing increasing tendency towards growing body weight, against the traditional wisdom, which in turn has been found to be strongly associated with metabolic risk factors. Tribal females are in more danger of developing metabolic risks at lower BMI, irrespective of age, clearly indicating an increasing tendency towards a double burden of disease among the Indian tribal populations. Therefore, this changing pattern of health among Indian tribes needs to be addressed immediately before the situation becomes too alarming.

Introduction

The Constitution of India recognizes the indigenous tribal groups or *Adivasis or Janjatis* as a special category and has designated them as the Scheduled Tribes. Mahatma Gandhi called the tribal people as *Girijan*. [1]Article 366 (25) defined STs as "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be STs for the purpose of this constitution". [2] Article 342 prescribes procedure to be followed in the matter of the specification of STs. The Indian constitution has recognized nearly 700 types of tribal population groups as Schedule Tribes. The total ST population of India stands at 104,281,034 as per 2011 census and accounts for 8.6% of the total population of the country [3]. The decadal population growth between census years 1981 to 1991 in respect of tribal population has been higher (31.64%) than that of entire population (23.51%). Similarly during census years 1991 to 2001 it has been 24.45% against the growth rate of 22.66% for the entire population [4,5]. As per the latest census data, the change in decadal growth of ST population during 2001-2011 is 23.7% [5,3]. As compared to the sex ratio for the overall population (933 females per 1000 males) the sex ratio among STs is more favorable, at 977 females per 1000 males [5]. This trend (990 females per 1000 males; Census 2011) also continued with respect to overall population of India (940 females per 1000 males; Census 2011). The literacy rate among the STs has increased from 29.62% to 47.10% during the period from 1991 to 2001 and it is 63.1% by 2009-10 [6] (NSS 66th round Report no 543, 2009-10). The infant mortality (62.1; NFHS 2005-06), under 5 mortality (95.7; NFHS 2005-06) and % of children under weight (55.9) in respect of STs is higher than that of the overall population as well as of other disadvantaged socio-economic groups [7].

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The main concentration of tribal population is in central India and in north-eastern states. However tribals are present in all states and Union Territories except Haryana, Punjab, Delhi, Pondicherry and Chandigarh. The states of Madhya Pradesh, Maharashtra, Gujarat, Rajasthan, Orissa, Bihar, West Bengal and Andhra Pradesh account for around 83% of the total tribal population of India. The tribal population of India inhabits widely varying ecological and geo-climatic conditions (hilly, forest, desert regions etc) in different concentration and with different socio-economic background. Tribal groups are homogenous, culturally firm, have developed strong magico-religious health care system and they wish to survive and live in their own style [8].

The economic practices in everyday life of tribal society is highly diverge which further varies from one tribal group to other. Many tribal populations of eastern, southern and central India (Chola Naikan, Juang, Birhor, Kadar, Chenchu, Hill Khadia and Makadia) and the Andaman islanders are efficient food gatherers and hunters. There are many tribal populations of north eastern, central and eastern region (Khasi, Naga, Kutia Kondha, Korwa, Saora, Hill Muria, etc.) who still practice shifting cultivation. There are settled agriculturists (Bhil, Mina, Santal, Munda, Oraon etc.) at par with other peasant communities in many parts of Madhya Pradesh, Gujarat, Rajasthan, Maharashtra, Bihar, West Bengal and Orissa. And there are urban industrial workers as well [9].

The differential access to outer world between tribal groups is remarkably different. On one hand there are Jarwas with virtually no contact with modern societies, on the other hand there are tribal industrial workers in Ranchi, Jamshedpur, Bacheli (Bastar), Rourkela, Bhilai etc. According to 2001 census 44.70% of the ST population were cultivators, 36.9% agricultural labourers, 2.1% household industry workers and 16.3% were other occupation workers. Thus about 81.6% of the main workers from these communities were engaged in primary sector activities.

It is generally agreed upon that the health status of tribal population of India is poor [10-16]. The widespread poverty, illiteracy, malnutrition, problems of potable water, sanitary and living conditions, poor maternal and child health services and practices, ineffective coverage of national health and nutritional services, communication facilities, prevalence of genetico-environmental disorders, have been traced out in several studies as possible contributing factors for the dismal health conditions prevailing among the tribal population of India. Unfortunately not many tribes are studied comprehensively for assessing the health status and its associated determinants.

Nutritional Status and Maternal and Child Health

Nutrition status of individuals and general health condition indicates the socio-economic condition prevalent the society. The pattern of health and nutrition problems of the tribal population of India is highly varied.. Nutritional problems of various tribal communities located at various stages of development are full of obscurities and very little scientific information on their dietary habits and nutritional status are available due to lack of systematic and comprehensive research investigations. Malnutrition is a common health issue in tribal areas and has greatly affected the general physique of the population. Malnutrition lowers the ability to resist infection, leading to chronic illness and in the post weaning period leads to permanent brain impairment. Good nutrition is required throughout life and is particularly vital for women to continue to remain in good health and to do everyday household work. Nutritional anemia is a major problem for women in India and more so in the rural and tribal belt. Maternal malnutrition is predominantly a serious health problem among the tribal women especially for those who have closely spaced multiple pregnancies. Such health condition also reflects the complex socio-economic factors that have serious bearing on their health. The nutritional status of pregnant women is also crucial for the infants' chances of survival and subsequent growth and development. It directly influences the reproductive performance of the women and the birth weight of their children. Nutrition also affects lactation and breast feeding which are key elements in the health of infants and young children and a contributory factor in birth spacing.

Dietary Habit

Dietary habit of most of the tribes in India is not satisfactory. Tribal diets are generally grossly deficient in calcium, Vitamin A, Vitamin C, riboflavin and animal proteins. Diets of south Indian tribes, in general and Kerala in particular, are grossly deficient even in respect of calories and total proteins. Studies carried out at National Institute of Nutrition (1971) and Planning Commission of India (Sixth five year plan, Government of India) reported a high protein calories malnutrition along the rice eating belts. Surveys on the nutritional deficiencies [17] among the tribals show a high incidence of goiter, angular stomatitis among the Mompas of Assam and Vitamin A deficiency among the Onges. A high incidence of malnutrition was observed [18,19,12] in some PTGs like Bondas in Koraput and in such other groups in Phulbani, and Sundergarh district of Orissa and also among Bhil, Garasia of Rajasthan, Padar, Rabari and Charan of Gujarat [15].

Pulses, milk and milk products and other animal products which were the main sources of protein are lacking in the diets of tribal women of Trivandrum district, Kerala [20]. Deficits of calcium in the diets of pregnant and lactating tribal women of western and central India were reported by [21]. Detailed clinical examination of the Kannikar tribal women showed that anaemia (90%), vitamin A deficiency (30%) and niacin deficiency (10%) were prevalent among these tribal women [20].

[22] ICMR bulletin (1996) documents high prevalence of goiter and intestinal parasites in Baigas of Baigachak area of Mandla district of Madhya Pradesh. RMRC Jabalpur reported incidence of Goitre as 11.6% among Bharias children below 5 years in Potal Kot valley in Chindwara district of M.P. Study among Pauri Bhuniyas of Orissa [23] showed that 52 women as against 17 men in a sample of 268 persons suffered from diseases related to malnutrition. Historically it has been observed that male and female individuals in tribal populations are undernourished. Study among Kondhs, a major tribe in central India has shown that over 55% of them consume less than 2000 calories per day [24] and most of them as little as 1700 calories [25] compared to the ICMR stipulated requirement of 2400 calories.

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Health care practices

Findings from studies among tribal groups in Bastar district shows maternal and childcare is largely neglected [26]. Proper and preventive health practices like immunization and vaccination of expectant mothers as well as new borns was largely absent. From inception to termination of pregnancy, no specific nutritious diet is consumed by women. The consumption of iron, calcium and vitamins during pregnancy is poor. More than 90% of deliveries are conducted at home attended by elderly ladies of the household. In addition a lot of females suffer from ill health due to pregnancy and childbirth in the absence of well defined concept of health consciousness.

As far as the child care is concerned, both rural and tribal illiterate mothers are observed to breast feed their babies. But most of them adopt harmful practices of discarding of colostrum, delaying the initiation of breast feeding and delaying the introduction of supplementary foods. Vaccination and immunization of infants and children have been inadequate among the tribal groups. Since the personal hygiene is very poor, the under 5 children are the worst sufferers and most vulnerable to infections.

Life style Diseases

It is true that the major focus of various studies related to health issues in tribal areas is on malnutrition. However, in the present context, it has become absolutely essential to conceptualize such studies which lay emphasis on assessment of the health status of various tribal groups with respect to obesity, metabolic measures, dietary profile and physical activity. Like all other developing countries, large scale urbanization/ modernization has been taking place in India with effective changes in lifestyles including food habits and decreased physical activity attributable to evolving circumstances of chronic conditions, for example dyslipidaemia, diabetes etc. Even the tribal groups are subjected to such changes. The benefits of development in education, health and income generation has resulted in a significant amount of their mainstreaming. A number of tribal groups are capitalizing on opportunities that are available to them, with a desire to acquiring a better life style with modern life comforts. In this process of acculturation their food habits are likely to undergo substantial changes and so does the level of their physical activity. Thus, in the present circumstances many of the tribal populations are becoming susceptible to various metabolic risk factors that may be related to their dietary profile and physical activity, and therefore, it is worth investigating the prevalence of obesity and metabolic measure and their association with dietary fatty acids among the adult males and females of the tribal groups of different geographic regions. The investigation of this nature, therefore, will help to understand the magnitude and the intensity of problems related with obesity and metabolic measures and their relationship with dietary profile in culturally heterogeneous groups of different geographical regions of India.

There are however, few studies available on Indian population that take into consideration dietary fatty acid profiles and their associated risk with cardiovascular diseases, obesity and metabolic disorders. The propensity to coronary heart disease (CHD) is known to be high in people of Asian Indian origin [27,28]. There is evidence that Indian women may be worse of than men in many aspects of risk for CHD [29]. Some risk factors for atherosclerosis are particularly high among South Asians. These include high plasma triglyceride (TG), increased level of total cholesterol (TC) and high density lipoproteins (HDL) ratio (TC:HDL), type 2 diabetes mellitus (T2DM), central or visceral obesity [30-32]. The Indian subcontinent is characterized by cultural heterogeneity which results in differences in food consumptions amongst the different communities across the Indian Diaspora [32,33]. This diversity in food consumptions is intriguing one and is unequivocally a potential risk factor for growing catastrophe from many chronic conditions such as dyslipidaemia in Asian Indians. Among Asian Indians one of the highest levels of Lipoprotein was observed and correlated to CHD [34,37]. People in this part of the world often use Vanaspati, a kind of hydrogenated oil. This contains more than 50% Trans fatty acid [35]. An observation on north Indian slum dwellers had reported that high oral intake of Trans fatty acid increases LDL and lowered HDL level in circulation. In addition Trans fatty acid also elevated the level of lipoprotein (a), an independent risk factor for CHD. About 50% of Asian Indians are vegetarians but their lipoprotein levels and rates of diabetes and CHD are no different from those of non vegetarians owing to contaminated vegetarianism, in which vegetarians manage to consume excessive amounts of saturated and trans fatty acids [36]. Here it is in the fitness of the case to state that most Asian Indians are lacto-ovo-vegetarians unlike western vegetarians [37]. In the midst of altering lifestyles and abundant use of Vanaspati to prepare foods, intake of trans fatty acid is likely to increase further in the Asian Indians [31,32].

Most importantly, in Asian populations mortality and morbidity from chronic diseases (eg. CHD) is occurring in people with lower body mass index and thus they tend to accumulate intra-abdominal or visceral fat without developing generalized obesity, i.e. BMI or % body fat [38,39]. The metabolic syndrome that has been defined as the constellation of CHD risk factors is associated with striking tendency to central obesity in south Asians although they are no more overweight than European or Americans [40,41]. People of South Asian origin (e.g. Indians) have more centralized obesity for a given level of BMI compared to Caucasians [42]. The prevalence of T2DM and/or Dyslipidaemia are high for Asian Indians both in India [43-46] and abroad [47-49,28,50]. It seems reasonable to argue that dietary management including dietary guidelines would be useful to retard the growing incidence of Diabetes in Indian population [51]. In yet another study it has been argued that while dealing with Dyslipidaemic Asian Indians, clinicians should consider obesity measures, metabolic profiles and dietary fatty acids simultaneously to better comprehend the condition [52].

Further, a number of studies have also been undertaken on Indian populations and Asian Indians in relation to obesity, BMI, pattern of subcutaneous fat, physical activity and ageing, and also some studies have reported associated social, cultural and behavioral variables with obesity measures [53-67].

Thus, studies related to health in transitional scenario among these culturally heterogeneous vast majority of tribal groups of India need immediate attention. More so, not only because of diversity in food consumption but also due to the changes, which are coming up

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due to acculturation which have also affected their life style including food habits due to modernism and has made them vulnerable to those non communicable diseases, which were not common among them.

Precisely for these reasons we also recently undertook a study to understand the association of age, sex and Body Mass Index (BMI) with the different metabolic health risk factors; among six tribes in Birbhum district of West Bengal and Mayurbhanj district of Odisha, in the eastern part of India. Of the total 1,434 subjects in the study; 705 were adult tribal males and 729 were adult tribal females belonging to the age group between 20 to 60 years. We investigated various aspects of BMI with respect to selected risk factors among the males and females of indigenous population groups in the age categories of ≤40 years and >40 years old. It was observed that a considerable proportion of the studied population was suffering from the stress of under nutrition. It is interesting to note that with the stress of under nutrition they are also susceptible to hypertension. It was also observed that in the pre-hypertensive risk category, the overall prevalence was more pronounced between the two age group categories. It is to be noted that tribal males in the ≤40 years old age group were found to be in more danger of developing metabolic risks like hypertension as compared to older males (>40 years old). Sesso et al have shown in their study that MAP (Mean Arterial Pressure) may be strongly associated with CVD (Coronary Vascular Disease) risk in younger men [68]. Dyer et al observed that the steady component of BP (highly correlated with MAP) was strongly associated with CVD risk in their four Chicago epidemiological studies [69].

Our study shows that male individuals with BMI ≥25 kg/m2 are in a stronger association with hyper-normal MAP in both the ≤40 years and >40 years old age groups. However, younger males (≤40 years old) show strongest association with hypertensive MAP, as well as with hypertensive BP (Blood Pressure). We also found >40 years old tribal males were more likely to develop different metabolic risks when they had a low BMI status. The overall tribal male population with raised BMI was two or more than two times likely to develop metabolic risks. Role of increased BMI in contributing towards CVD risks among indigenous Indian populations (Nicobarese tribe) has been reported previously [70].

With respect to the tribal females, it was found that the prevalence of the selected metabolic variables was higher than in the males, in both the age groups. Schall, in her meta-analysis on traditional and tribal societies has shown that older women are at double risk of hypertension than older men [71]. However, the selected risk measures among the females in the present study showed significant association with low BMI, which explains the high under nutrition stress among the females in both the younger as well as the older age group. Dettwyler in his study among rural populations of Mali showed that under nutrition among adult populations is due to under nutrition stress during childhood, a low protein diet and hard physical labour [72]. In the present study it can be inferred that the high prevalence of hypertension among females with low BMI in the middle or older age groups might be due to low BMI status during the early years. The present results with respect to association between high blood sugar and low BMI correspond to previous studies showing the association between low BMI and glucose intolerance indicative of high glucose load [73-76]. The mean SBP (Systolic Blood Pressure) and DBP (Diastolic Blood Pressure) with respect to all the selected metabolic risks are much higher among the tribal females than their male counterparts. A similar result has been observed in another previous study involving tribal populations [77].

Previous studies [70,78-81] among indigenous populations in India show that hypertension has a positive correlation with raised BMI which further exacerbates with growing age. In this study, we found that BMI is a strong facilitator of hypertension among tribal males in general and among younger males in particular. We also found that individuals with BMI ≥25 kg/m2 showed a strong association with hypertensive BP and hypertensive MAP along with hypertensive SBP and hypertensive DBP.

So, as per the findings of this study, individual BP parameters like MAP, SBP and DBP can be considered to plot cardiovascular risks, particularly in younger tribal populations. Increased age is a decisive factor for increased hypertensive risk. Irrespective of age, a raised BMI puts at risk the cardiovascular health of younger males. This has also been observed in other Indian tribal groups [82,83]. Stini in his hypothesis proposed that variation due to environmental stresses is reflected more among males [84]. In the tribal women, low BMI is highly prevalent, irrespective of age group, along with high prevalence percentage of hypertension; making the association between raised BMI non-significant with respect to most of the metabolic indicators of hypertension. Such a trend is observable both in younger as well as older females.

Conclusion

Previous studies among indigenous Indian populations have shown an association of under nutrition and anaemia with high BP [80]. Studies have also shown that malnutrition [85,86] and particularly under nutrition [87-90] influences the immune system negatively which may further lead to causation of disease conditions [91]. Results of the present study indicate that young tribal males are showing increasing tendency towards growing body weight, against the traditional wisdom, which in turn has been found to be strongly associated with metabolic risk factors. Tribal females are in more danger of developing metabolic risks at lower BMI, irrespective of age. So the present status of health suggests an increasing tendency towards a double burden of disease among the Indian tribal populations. Therefore, health of these indigenous population groups needs to be looked into holistically, so that timely intervention can be made against this silent epidemic. And finally there is a need to move away from the traditional wisdom that non-communicable diseases specially the Coronary Heart Diseases are not the component of tribal morbidity. On the contrary one can visualize changing pattern of tribal health as a part of distinct life style changes, which needs to be addressed immediately before the situation becomes too alarming.

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References

1. Government of India. Article 366 (25). In: The Constitution (Schedule Tribes) Order 1950: 5th Schedule.
2. Government of India. Article 342. In: The Constitution (Schedule Tribes) Order 1950.
3. Planning Commission. Government of India. Census of India 2011.
4. Planning Commission. Government of India. Census of India 1991.
5. Planning Commission. Government of India. Census of India 2001.
6. Ministry of Statistics and Programming, Government of India. 2009-10. NSS 66th round: Report no 543.
7. Government of India. (2007) National Family Health Survey (NFHS) 2005-2006.
8. Kapoor AK (1996) Ecology, Demographic Profile and Socio-Economic Development of a Tribe of Central Himalaya: 118-138. In: Tribal Development: Options. Prasana K. Sarnal (Ed.). Gyanodaya Prakashan .
9. Behura K (1995) Tribes in India: Planned development In: Tribals in India: Development. Deprivation and Discontent. A.K. Singh and M.K. Jabbi (Eds.). Har Ananda. New Delhi. pp. 98-117.
10. Basu S (1986) Genetics, Socio-Cultural and Health care among tribal groups of Jagdalpur and Konta Tehsils of Bastar District, Madhya Pradesh. In: A.K. Kalla and K.S. Singh (Eds.), Anthropology, Development and Nation building, Concept Publishing Company, New Delhi.
11. Swain S, Jena SC, Singh P (1990) Morbidity status of the Kondh tribes of Phulbani (Odisha), In: B. Chaudhari (Ed.). Cultural and Environmental Dimension of Health, Inter-India Publication, New Delhi. 177-191.
12. Mahapatra LK, Das J (1990) Nutritional ecosystems of Orissa tribals. In: Cultural and Environmental Dimensions of Health. B.Chaudhuri (Eds.) Inter-India Publications, New Delhi.
13. Rizvi SNH (1986) Health practices of the Jaunsaris: A socio cultural analysis. In: Tribal Health: Socio-cultural Dimensions, B. Choudhury (Ed.). Inter-India Publications, New Delhi. 223-246.
14. Mukherjee BM (1986) Aging Members and their Health in Changing Techno-Economic Condition. In: Buddhadeb Chaudhuri (Ed.). Tribal Health. New Delhi : Inter-India Publications.
15. Haque M (1990) Height weight and nutrition among the six tribes of India. In: L.B. Chaudhary (Ed.). Cultural and Environmental dimensions on health. Inter-India Publication, New Delhi.192-206.
16. Chaudhuri B (1986) Medical Anthropology in India with special reference to tribal population. In: B. chaudhari (Ed.). Tribal health, socio-cultural dimensions. Inter-India Publications. New Delhi.
17. Gopalan C, Vijaya Raghavan K (1971) Nutritional atlas of India. ICMR, New Delhi.
18. Ali A (1980) Health and genetic problems of Kutia Kondhs of Burlubaru village Phulbani district, Orissa. The Newsletter (Govt. of India, Min. Home Affairs, Trib. Dev. Div., N. Delhi) 1: 103-114.
19. Basu SK (1990) Health scenario and health problems of the tribal population in India. Paper presented at the seminar on" Continuity and Change in Tribal Society" at IIAS, Shimla, Jan. 14-18.
20. Prema L, Thomas F (1992) Nutrition and health problems faced by Kanikkar women. In: Dimensions of Scheduled Tribes development in India. (Eds.). P.D. Tiwari and R.S. Tripathi. Uppa Publishing House, New Delhi.
21. Gopaldas T (1987) Nutritional status of selected tribes of western and central India. Proceedings of the Nutrition Society of India. 33: 76-89.
22. ICMR (1996). Control of Iodine deficiency through safe use of iodized salt. ICMR Bulletin. 26(6).
23. Ali A (1992) Nutrition. In: State of India's Health. (Ed.). Alok Mukhopadhyay. Voluntary Health Assoc of India. New Delhi.
24. Patel S (1985) Ecology, Ethnology and Nutrition: A Study of Kondh Tribals and Tibetan Refugees. Mittal Publication. Delhi.
25. Sharma K (1979) The Kondhs of Orissa. An anthropometric study. Concept Publishing Company, New Delhi.
26. Basu SK, Kshatriya GK (1989) Fertility and mortality in tribal populations of Bastar district, MP. Biology and Society 6: 110-112.
27. Enas EA, Yusuf S, Mehta JL (1992) Prevalence of coronary artery disease in Asian Indians. Am J Cardiol 70: 945-949.
28. Yusuf S, Howken S, Ounpuu S, Dans T, Avezun A, et al. (2004) Effect of potential modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case control study. Lancet 364: 937-952.
29. Mahajan D, Bermingham MA (2004) Risk factors for coronary heart disease in two similar Indian population group: one residing in India and the other in Sydney, Australia. Eur J Clin Nutr 58: 751-760.
30. Pais P, Pogue J, Bernstein H, Zachariah E, Savitha D, et al. (1996) Risk factor for acute myocardial infarction in India: a case control study. Lancet 348: 358-363.
31. Enas EA (2000) Coronary artery disease epidemic in Indians: a case for alarm and call for action. J Indian Med Assoc 98: 694-702.
32. Ghosh A, Bose K, Das Chaudhuri AB (2003) Association of food patterns, central obesity measures and metabolic risk factors for coronary heart disease (CHD) in middle aged Bengalee Hindu men, Calcutta, India. Asia Pac J Clin Nutr 12: 166-171.
33. Ghosh A (2004) Anthropometric, central obesity, metabolic and blood pressure variables in dyslipidaemic and non-dyslipidaemic adult Bengalee Hindu men of Calcutta, India. Nutr Metab Cardiovas Dis 14: 170-172.
34. Anand SS, Enas EA, Pogue J, Haffner S, Pearson T, et al. (1998) Elevated lipoprotein (a) levels in South Asians in North America. Metabolism. 47: 182-184.
35. Misra A, Sharma R, Pandey RM, Khanna N (2001) Adverse profile of dietary nutrients, anthropometry and lipids in urban slum dwellers of northern India. Eur J Clin Nutr. 55: 727-734.
36. Enas EA, Yusuf S (1999) Third meeting of the International Working Groups on Coronary Artery Disease in South Asians. Indian Heart J 51: 99-103.
37. Enas EA, Senthilkumar A, Chennikkara H, Bjurlin MA (2003) Prudent diet and preventive nutrition from paediatrics to geriatrics: current knowledge and practical recommendations. Indian Heart J 55: 310-338.
38. WHO/ IASO/IOTF (2000). The Asia-Pacific Perspective: Redefining obesity and its Treatment. Health Communication Pty Ltd. Australia.
39. Ghosh A, Bose K, Das Chaudhuri AB, Chattopadhyay J, Das Gupta G, et al. (2004) Central obesity and coronary risk factors. J R Soc Health 124: 86-91.
40. Misra A, Vikram NK (2002) Insulin resistance syndrome (metabolic syndrome) and Asian Indians. Curr Sci. 83: 1483-1496.
41. Ghosh A (2005) Factor analysis of metabolic syndrome among the middle aged Bengalee Hindu men of Calcutta, India. Diabetes Metab Res Rev 21: 58-64.
42. McKeigue PM, Shah B, Marmot MG (1991) Relation of central obesity and insulin resistance with high prevalence and cardio-vascular risk in South Asians. Lancet 337: 382-386.
43. Gupta R, Gupta VP (1996) Meta-analysis of coronary heart disease prevalence in India. Indian Heart J 48: 241-245.
44. Ramachandran A, Sathyamurthy I, Snehalatha C, Satyavani K, Sivasankari S, et al. (2001) Risk variables for coronary heart disease in Aisan Indians. Am J Cardiol. 87: 267-271.
45. Kutty R, Soman CR, Joseph A, Kumar KV, Pishrody R (2002) Random capillary blood sugar and coronary risk factors in a south Kerela population. J Cardiovasc Risk. 9: 361-367.

Citation: Gautam Kumar K. Changing Perspectives of Tribal Health in the Context of Increasing Lifestyle Diseases in India. J Environ Soc Sci. 2014;1(1): 101.

46. Gupta R, Deedwani PC, Gupta A, Rastogi S, Panwar RB, et al. (2004) Prevalence of metabolic syndrome in an urban Indian population. Int J Cardiol 97: 257-261.

47. Deurenberg-Yap M, Chew SK, Lin VEP, Tan BY, van Staveren WA, et al. (2001). Relationships between indices of obesity and its co-morbidities in multi-ethnic Singapore. Intl J Obes Relt Metab DIsord. 25: 1554-1562.

48. Ho SC, Chen YM, Woo JL, Lam TH, Janus ED, et al. (2001) Association between simple anthropometric indices and cardio-vascular risk factors. Int J Obes Relat Mtab Disord 25: 1689-1697.

49. Bhalodkar NC, Blun S, Rana Y, Bhalodkar A, Kitchappa R, et al. (2004) Comparison of levels of large and small high density lipoprotein cholesterol in Asian Indian men compared with Caucasian men in the Framingham Offspring study. Am J Cardiol. 94: 1561-1563.

50. Ezenwaka CR, Kalloo R (2005) Carbohydrate induced hypertriglyceridaemia among West Indian diabetic and non-diabetic subjects after injection of three local carbohydrate foods. Indian J Med Res. 121: 23-31.

51. Ghosh A (2006) Effects of socio-economic and behavioral characteristics in explaining central obesity: a study on adult Asian Indians in Calcutta, India. Coll Antropol. 30: 265-271.

52. Ghosh A (2007) Comparison of anthropometric, metabolic and dietary fatty acids profiles in lean and obese dyslipidaemic Asian India male subjects. Eur J Clin Nutr. 61: 412-419.

53. Kapoor S, Kapoor AK, Singh IP, Bhalla R, (1985) Parent offspring correlation for body measurements and subcutaneous fat distribution. Hum Biol. 57: 141-150.

54. Satwanti, Singh I P, Bharadwaj H. 1980. Am J Phys Anthropol. 53: 611.

55. Bharati P (1989) Variation in adult body dimensions in relation to economic condition among the Mahishyas of Howrah district, West Bengal, India. Ann Hum Biol. 16: 529-541.

56. Naidu AN, Rao NP (1994) Body mass index: a measure of the nutritional status in Indian population. Eur J Clin Nutr 48: S131- S140.

57. Joyce KP, Kapoor S (1996) Pattern of subcutaneous fat distribution, its variation with age among young Rajput females of Pauri Garhwal, India. Journal of Human Ecology. 7: 45-49.

58. Chatterjee A, Dhingra V, Khanna N, Sanduja S, Sharma R, et al. (2002) Prevalence of imbalanced diet in urban adolescents and young adults of Northern India (Abstract). J Assoc Physicians India. 50: 1522.

59. Tandon K, Kapoor S, Kapoor AK (2011) Covariates and Prevalence of Obesity among Adult North Indian Population. Coll Antropol 35: 305-311.

60. Agarwal P, Mishra V (2004) East-West Center Population and Health Status. 116: 26.

61. Tyagi R, Kapoor S. 2004. Anthropologie. 42:141.

62. Misra A, Wasir JS, Vikram NK (2005) Waist circumference criteria for the diagnosis of abdominal obesity are not applicable uniformly to all populations and ethnic groups. 21: 969-976 .

63. Sinha R, Kapoor S (2005) Fat patterning among Indian adolescent boys and girls. Ind J Phys Anthropol Human Gen 24: 135-41.

64. Tyagi R, Kapoor S, Kapoor AK (2005) Body composition and fat distribution pattern of urban elderly females, Delhi, India. Collegium Antropologicum. 29: 493-498.

65. Misra A , Vikram NK, Gupta R, Pandey RM, Wasir JS, et al. (2006) Waist circumference cutoff points and action levels for Asian Indians for identification of abdominal obesity. Int J Obes. 30: 106-111.

66. Mohan V, Deepa R (2006) Obesity and Abdominal Obesity in Asian Indians. Indian J Med Res 123: 593-596.

67. Sinha R, Kapoor S, Kapoor AK (2008) Tracing the response of subcutaneous fat accumulation in two generations of males. HOMO - J. Comp. Hum. Bio. 59: 429-438.

68. Sesso HD, Stampfer MJ, Rosner B, Hennekens CH, Gaziano JM, et al. (2000) Systolic and Diastolic Blood Pressure, Pulse Pressure, and Mean Arterial Pressure as Predictors of Cardiovascular Disease Risk in Men. Hypertension 36: 801-807.

69. Dyer AR, Stamler J, Shekelle RB, Schoenberger JA, Stamler R, et al. (1982) Pulse pressure- III: prognostic significa ce in four Chicago epidemiologic studies. J Chron Dis 35: 283-294.

70. Manimunda SP, Sugunan AP, Benegal V, Balakrishna N, Rao MV, et al. (2011) Association of hypertension with risk factors & hypertension related behaviour among the aboriginal Nicobarese tribe living in Car Nicobar Island, India. Indian Jmed Res133: 287-293.

71. Schall JI (1995) Sex Differences in the Response of Blood Pressure to Modernization. American Journal of Human Biology 7: 159-172.

72. Dettwyler KA (1992) Nutritional status of adults in rural Mali. Am J Phys Anthropol 88: 309-21.

73. Swai AB, Kitange HM, Masuki G, Kilima PM, George KM, et al. (1992) Is Diabetes Mellitus Related To Under nutrition In Rural Tanzania ? BMJ: British Medical Journal 305: 1057-1062.

74. West KM (1978) Epidemiology of diabetes and its vascular complications. In: Keen H, Pickup JC, Talwalkar CV, (Eds). In Proceedings of Satellite Meeting of IXth International Diabetes Federation Meeting 1978: Bombay. London: International Diabetes Federation.

75. Van der Sande MA, Ceesay SM, Milligan PJ, Nyan OA, Banya WA, (2001). Obesity and under nutrition and cardiovascular risk factors in rural and urban Gambian communities. Am j public health 91: 1641-1644.

76. Bhargava SK, Sachdev HS, Fall CH, Osmond C, Lakshmy R, et al. (2004) Relation of serial changes in childhood body-mass index to impaired glucose tolerance in young adulthood. N Engl J Med. 350: 865-875.

77. Babu BV, Kusuma YS, Naidu JM (1996) Distribution of blood pressure and influence of subcutaneous fat on systolic and diastolic levels in a tribal population. J Ind Med Asso 94: 289-293.

78. Kusuma YS, Babu BV, Naidu JM (2002) Blood pressure levels among a few cross-cultural populations of Visakhapatnam district, Andhra Pradesh, India. Ann Hum Biol 29: 502-512.

79. Mukhopadhyay B, Mukhopadhyay S (2001) Blood pressure and its biocultural correlates among the Lepchas of Sikkim, India: a micro level epidemiological study. Coll Antropol 25: 97-110.

80. Kerketta AS, Bulliyya G, Babu BV, Mohapatra SS, Nayak RN (2009 Health status of the elderly population among four primitive tribes of Orissa India: a clinico-epidemiological study. Z Gerontol Geriatr 42; 53-59.

81. Sachdev B (2011) Prevalence of hypertension and associated risk factors among Nomad Tribe groups Screening of Hypertension, Adiposities and ABO Blood Group among Select Nomad Tribes of Rajasthan, India. Antrocom Online Journal of Anthropology 7: 181-189.

82. Bose K, Bisai S, Chakraborty F (2006) Age Variations in Anthropometric and Body Composition Characteristics and Underweight Among Male Bathudis - A Tribal Population of Keonjhar District, Orissa, India. Coll Antropol 30: 771-775.

83. Chakraborty R, Bose K (2008) Anthropometric characteristics and nutritional status of adult Oraon men of Gumla District, Jharkhand, India. The Internet Journal of Biological Anthropology 1: 0-6.

84. Stini WA (1985) Growth rates and sexual dimorphism in evolutionary perspective. In: Gilbert RI, Mielke JH, (Eds) The Analysis of Prehistoric Diets. New York: Academic Press. 191-226.

85. Martí A, Marcos A, Martínez JA (2001) Obesity and immune function relationships. Obesity reviews : an official journal of the International Association for the Study of Obesity 2: 131-140.

86. Cunningham-Rundles S, Moon A, McNeeley DF (2008) Malnutrition and Host Defense. In Nutrition in Paediatrics. 4th edition. Edited by Duggan C, Watkins JB, Walker A. USA: pmph; 260-271.

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87. Chandra RK (1991) Nutrition and immunity: lessons from the past and new insights into the future. Am J Clin Nutr 53: 1087-1101.

88. Chandra RK (1997) Nutrition and the immune system. A J Clin Nuir 66: 460S-463S.

89. Meydani SN (1991) Dietary modulation of the immune response in the aged. Age 14: 108-115.

90. Mazari L, Lesourd BM (1998) Nutritional influences on immune response in healthy aged persons. Mech Ageing and Dev. 104: 25-40.

91. Krause D, Mastro AM, Handte G, Smiciklas-Wright H, Miles MP, et al. (1999) Immune function did not decline with aging in apparently healthy, well-nourished women. Mechanisms of ageing and development. 112: 43-57.

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