

## Prevalence of cardiovascular risk factors with aging: A study in a biologically isolated group of North East India

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### Abstract

Cardiovascular diseases become increasingly common with advancing age. As a person gets older, the heart undergoes subtle physiologic changes. The present study was conducted in a biologically isolated group viz. Kalita, a caste population of Assam, North East India to find out the ageing trend in cardiovascular risk factors and its association with anthropometric adiposity indices. The cross sectional study included 482 adult females aged 20-49 years. The subjects were divided into three different age groups to study the ageing trend. In the present study cardiovascular risk increases significantly with age. Positive correlation of waist circumference and waist height ratio with blood pressure indicates regional obesity to be a risk factor for cardiovascular health.

### INTRODUCTION

An estimated 17.3 million people died from cardiovascular diseases (CVD) in 2008, representing 30% of all global deaths.<sup>[1]</sup> The main causes of cardiovascular disease are aging<sup>[2]</sup>, hypertension and obesity.<sup>[3]</sup> Obesity, a prevalent metabolic disorder affecting not only in the developed countries but also in the developing world<sup>[4]</sup> like India. Body mass index or BMI (weight in kilograms divided by the square of the height in meters) is promulgated by the World Health Organization as the most useful epidemiological measure of obesity.<sup>[27,5]</sup> Waist circumference (WC), waist-hip circumference ratio (WHR) and waist-height ratio (WHtR) are also commonly used to predict the risk of obesity related morbidity and mortality as they account for regional abdominal adiposity.<sup>[6-7]</sup> Prasad et al stated that obesity associated cardiovascular disorder (CVD) shows variations across regions and ethnicities.<sup>[8]</sup> Strong correlation of BMI with blood pressure among Jain females of Delhi indicates BMI to be a stronger risk factor for cardiovascular health.<sup>[9]</sup> Welborn et al found that the Australian urban population had stronger correlations of systolic (SBP) and diastolic blood pressure (DBP) with BMI and waist circumference.<sup>[10]</sup> Increasing trend in systolic and diastolic blood pressure with advancing age were reported by Kapoor et al.<sup>[11]</sup> According to them their increase or decrease depends on the lifestyle factors, physical activity level and environment.

In the present study, an attempt has been made to find the prevalence of cardiovascular risk factors with aging among Kalita population of Assam, North East India.

### MATERIALS AND METHODS

#### Area and people

**Kalita**, a biologically isolated caste population of the state of Assam, North East India are mainly concentrated in the Brahmaputra valley. They belong to Caucasoid race and practice endogamy like other caste groups.<sup>[12]</sup> They use to speak Assamese which is an Indo-Aryan language. Kalita have their own distinct culture and inhabitate in plain areas of Assam. They practice agriculture as their main occupation for sustainability but some of

them are also involved in business and jobs. They are non-vegetarian and consume fish, duck, chicken etc. with rice as their staple diet.

### METHODOLOGY

The present cross sectional study included 482 Kalita females aged 20 to 49 years inhabiting Lakhimpur, Dhemaji and Dibrugarh districts of Assam. The subjects were divided into three different age groups with ten years interval to study the prevalence of cardiovascular risk factors with aging. The purpose of the study and techniques to be used were explained to each subject. Written consent with basic ethical standards was obtained from those who volunteered for the study. Anthropometric measurements (height, weight and body circumferences) were taken by using standard protocols given by Weiner and Lourie.<sup>[13]</sup> Cardiovascular risk factors as blood pressure, heart rate and pulse rate were recorded using aneroid sphygmomanometer and stethoscope following standard technique. BMI was computed and each age group was analyzed according to the recommended cutoff points for Asians.<sup>[14]</sup> Subjects were classified into different categories of blood pressure.<sup>[15]</sup>

The data was analysed statistically with the help of SPSS version 17. Mean, standard deviation, correlation coefficients, chi square and ANOVA were computed.

### RESULT

Descriptive characteristics of the anthropometric and cardiovascular risk factors among Kalita females of Assam categorised into different age groups are represents in the table 1. ANOVA analysis showed statistically significant difference in the mean value of height, BMI, hip circumference, WC, WHtR, SBP and DBP. Whereas body weight, WHR, heart rate, pulse rate did not differ significantly.

Table 2 shows the prevalence of adiposity and hypertension in different age groups of Kalita females. With respect to general obesity (BMI), majority of the females in age group of 20- 29 years were underweight (45.2%) whereas overweight was prevalent among 30- 39 years of age (49.2%). Considering central

**Table 1.** Basic data of the Kalita females in different age groups.

Variables	20-29 years		30- 39 years		40-49 years		F	Sig.
	Mean	SD	Mean	SD	Mean	SD		
Height	155.62	5.09	154.07	5.95	153.53	5.61	5.350	0.005
Body weight	51.75	7.59	52.97	7.75	51.90	7.95	1.140	0.321
BMI	21.34	2.77	22.29	2.85	21.99	3.01	4.488	0.012
WC	67.58	7.34	70.36	9.12	70.57	8.93	5.751	0.003
Hip Circumference	84.94	7.91	87.71	9.87	87.65	10.42	4.310	0.014
WHR	0.80	0.07	0.80	0.07	0.81	0.06	0.697	0.499
WHt.R	0.43	0.05	0.46	0.06	0.46	0.06	9.916	0.000
SBP	118.76	15.59	120.96	13.67	132.23	20.03	24.758	0.000
DBP	74.49	11.81	77.60	10.48	82.13	10.99	15.480	0.000
Heart Rate (HR)	75.63	10.59	73.70	10.36	74.88	9.66	1.414	0.244
Pulse Rate (PR)	74.05	10.23	72.16	10.16	73.70	9.40	1.568	0.210

BMI- Body Mass Index, WC- Waist Circumference, WHR- Waist Hip Ratio, WHtR- Waist Height Ratio. SBP- Systolic Blood Pressure, DBP- Diastolic Blood Pressure.

adiposity, 38.1% (WHR), 44.4% (WHtR) and 46.9% (WC) were in risk category in age group of 30 to 39 years as compared to others. The distribution of females in different categories were found to be significant except for WHR ( $p < 0.001$ ).

Hypertension was more prevalent among 40 to 49 years of age (SBP-52.6% and DBP-42.9%). Prehypertension was found to be prevalent among females aged 20-29 years (SBP - 40.50%) and 30 to 39 years (37.3%). Significant differences were observed ( $p < 0.001$ ) between the categories of the blood pressure in different age groups.

Correlation of age and adiposity indices with cardiovascular risk factors among Kalita females are given in Table 3. There were significant positive correlation of age with BMI, WC, WHtR and BP. It indicates increase in blood pressure (SBP and DBP) and both general and regional obesity with advancing age. There were also found that central obesity (WC and WHtR) were significantly ( $p < 0.01$ ) associated with both SBP and DBP.

## DISCUSSION

Kalita, a major community of Assam, North East India are living in both urban and rural areas. In the present study it was found that the socio economic conditions were relatively better who were living in town and cities as compared to villages. Most of the urban Kalita females are in service as their primary occupation. The differences in nutritional status is found among

them can be attributed to their different socio-economic status. Prevalence of hypertension has increased in traditional populations undergoing modernization.<sup>[16]</sup> In the present study, majority of them were not aware about their hypertension status but reported prolonged weakness and tiredness. Relevance of general and regional adiposity markers have been recognized for estimating cardiovascular disease risk factors, particularly due to their positive association with hypertension.<sup>[17]</sup> But the estimates of prevalence of overweight and obesity will depend on the methodological factors, the definition of obesity used and the composition of the community examined by age, ethnicity, and socio- economic condition.<sup>[18]</sup> Abdominal obesity is considered as an independent predictor of cardiovascular risk factors, morbidity, and mortality.<sup>[19]</sup> In the present study the mean of abdominal obesity (WC, WHR and WHtR) and blood pressure (both SBP and DBP) were found to be increase with increasing age. This age increasing trend in cardiovascular risk factors and blood pressure is reported by Esmailzadeh et al among the urban adult population of Tehranian.<sup>[20]</sup>

Previous research has shown that lifestyle factors including low physical activity, sedentary behaviours and unhealthy dietary choices were associated with obesity and overweight.<sup>[21]</sup> In this present study overweight is prevalent among 30 to 39 years of age which is greater as compared to rest of the age groups.

**Table 2.** Age wise distribution of Kalita females in different categories of obesity markers and blood pressure

Variables	Categories	20-29 years	30-39 years	40-49 years	X <sup>2</sup>
BMI	Underweight	28	18	16	10.86*
		45.20%	29.00%	25.80%	
	Overweight	13	32	20	
		20.00%	49.20%	30.80%	
	Normal	117	109	76	
		38.70%	36.10%	25.20%	
WC	Risk	10	23	16	6.41*
		20.40%	46.90%	32.70%	
	Normal	148	136	96	
		38.90%	35.80%	25.30%	
WHR	Risk	74	85	64	3.01
		33.20%	38.10%	28.70%	
	Normal	84	74	48	
		40.80%	35.90%	23.30%	
WHt.R	Risk	14	36	31	17.48***
		17.30%	44.40%	38.30%	
	Normal	144	123	81	
		41.40%	35.30%	23.30%	
SBP	Prehypertension	79	73	43	35.895***
		40.50%	37.40%	22.10%	
	Hypertension	17	20	41	
		21.80%	25.60%	52.60%	
	Normal	62	66	28	
		39.70%	42.30%	17.90%	
DBP	Prehypertension	46	53	43	20.916***
		32.40%	37.30%	30.30%	
	Hypertension	13	23	27	
		20.60%	36.50%	42.90%	
	Normal	99	83	42	
		44.20%	37.10%	18.80%	

\*p&lt;0.05, \*\*\*p&lt;0.001

**Table 3.** Association of age and different cardiovascular factors with physiological and adiposity indices among Kalita females

Variables	BMI	WC	WHR	WHt.R	Heart Rate	Pulse Rate	SBP	DBP
Age	.105*	.151**	.076	.195**	-.004	.003	.360**	.349**
BMI	1	.568**	.045	.588**	-.005	-.005	.089	.090
WC	.568**	1	.486**	.955**	.078	.084	.150**	.177**
WHR	.045	.486**	1	.498**	.037	.051	.018	.079
WHt.R	.588**	.955**	.498**	1	.083	.100*	.138**	.181**

Correlation is significant at the \*\*0.01 level (2-tailed); \*0.05 level (2-tailed).

Age was significantly correlated with both SBP and DBP among the Kalita population. Blood pressures increased progressively with advancing age showing the dependence of blood pressure on age. Similar study is reported earlier by Mungreiphy et al among Tangkhul Naga population.<sup>[2]</sup> With respect to association of age with general obesity (BMI), the central obesity (WC and WHtR) were found to be more statistically significant. On associating of the central obesity with blood pressure among Kalita population of Assam, North East India, it was found that WC and WHtR were strongly correlated with both systolic and diastolic blood pressure. Risk of total cardiovascular events increased with the degree of regional, central or abdominal obesity were reported earlier.<sup>[22-23]</sup> It has been indicating at the present study that the women with greater android fat mass were at an increased risk of developing cardiovascular diseases with advancing age. Similar studies have been reported earlier by Gustafsson, Colombel et al and Tyagi et al.<sup>[24-26]</sup>

## CONCLUSION

By these studies it can be concluded that the Kalita population of Assam, North East India have the increasing trend in prevalence of hypertension with increasing age. The regional obesity that is WC and WHtR has been found to be a greater risk factor for screening cardiovascular health supported by the strong correlation of WC and WHtR with systolic and diastolic blood pressure. Further studies are needed in this field to control cardiovascular diseases. More awareness should be given by the Government and non- governmental organizations for proper lifestyle and management.

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