

Blood pressure in relation to Body mass index among the Bhatra of Bastar, Chhattisgarh, India

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ABSTRACT

Background and objectives: A positive association between body mass index and systolic blood pressure as well as body mass index and diastolic blood pressure is well documented by many studies. This study examines blood pressure and body mass index in a tribal population namely the Bhatra of Chhattisgarh.

Material and Methods: A total of 144 adult subjects (men= 65; women= 79) were randomly selected. Body mass index cut-off value for Asian people was considered as recommended by the WHO expert group (WHO 2000). While, blood pressure values were classified according to WHO expert committee (WHO 1996).

Results: This study suggests a positive relationship between body mass index and blood pressure. Level of blood pressure was relatively lower both in men and women who had normal body mass index in comparison with overweight and obese individuals.

Conclusion: Traditional populations all over the world are generally characterised with low level of blood pressure. The Bhatra being a tribal population show considerably higher level of blood pressure. This trend is corroborative of changing socioeconomic environment and blood pressure level among them.

Key words: Systolic and diastolic blood pressure. Body mass index. Adult Bhatra. Chhattisgarh.

INTRODUCTION

Body mass index (BMI) is positively and independently associated with morbidity and mortality from hypertension, cardiovascular disease, type II diabetes mellitus, and other chronic diseases (Pi-Sunyer 1993). Many studies have documented a positive association between BMI and SBP (systolic blood pressure) and BMI and DBP (diastolic blood pressure) (Hubert et al. 1983, Mokdad et al. 2003, Gelber et al. 2007, Shuger et al. 2008 and many others). On the other hand, loss of body weight reduces blood pressure (BP) considerably (Neter et al. 2003, Harsha et al. 2008).

The burden of cardiovascular disease is high in South Asian countries, in their process of economic development (Nishtar 2002). Many studies indicate that high blood pressure is associated with age and is because of the process of modernization (Schall 1995, Mungreiphy and Kapoor 2009). India in a process of rapid economic development and modernization with changing lifestyle factors has an increasing trend of hypertension, especially among the urban population (Gupta 2004).

The tribes and castes in India, represent a substantial percent of the country's population, are believed to have lower blood pressure than other ethnic groups (Kusuma et al. 2002). Gradually, with changing social environment, marked increase in blood pressure was noted (Nirmala 2001) (cf. Mungreiphy et al. 2011). However, few tribes and castes have been explored for such studies, in spite of India's diversity in terms of biological as well as sociocultural backgrounds, especially in northeastern region of India (Mungreiphy et al. 2011). The principal objective of this study was to examine blood pressure and BMI among the Bhatra of Bastar, Chhattisgarh, India.

MATERIALS AND METHODS

The Bhatra tribe are distributed in Bastar, Chhattisgarh, and in adjacent part of Odisha. They are mostly a rural community, who speak in Bhatri, an Indo-Aryan language. The Bhatra are divided into a number of exogamous totemic clans. Monogamy is the common practice, though polygamy is occasionally allowed. Nowadays, they cultivate their lands and collect forest produce and fish in the river. They also work as daily-wage labourers. The Bhatra worship the clan gods like *Goli Deo*, village gods like *Mata* and the regional god, *Danteswari*. These days some of the Bhatra children are attending schools and colleges. Though they make use of modern medicine, they prefer their indigenous health care methods (Singh 1994). For the sake of present study samples were collected from Nagamaar and Talnar village of Jagdampur block, Bastar district, Chhattisgarh during January, 2018.

A door to door survey was conducted by one of the authors (SD) to collect necessary data. The Bhatra samples were free from any selection bias. Participants were healthy men (age ranges between 18 and 65 years) and women (age ranges between 18 and 55 years). A total of 144 subjects were selected randomly (men=65 and women=79). Anthropometric and physiometric data were collected from the participants who reported not to be suffering from any chronic or acute diseases at the time of survey. Body height was recorded in centimetre and body weight was recorded in kilogram to the nearest 0.1 cm and 0.5 kg respectively, using standard Martin's anthropometer and standard weighing scale. BMI cut-off values for Asian people, recommended by the WHO expert group (WHO 2000) was considered in the present study. Physiometric measurements of SBP and DBP (mmHg) were measured by mercury sphygmomanometer. Blood pressure values were classified according to the report of a WHO expert committee (WHO 1996).

RESULTS

Descriptive statistics of the variables is presented in Table 1. The Bhatra men in this study were taller (men: mean=157.92; women: mean=150.57) and heavier (men: mean=56.23; women: mean=48.43) than their counterpart. Mean of BMI (men: mean=22.52; women:

mean=21.38), SBP (men: mean=129.58; women: mean=116.33) and DBP (men: mean=83.88; women: mean=79.81) all were found to be higher among men than that of the women.

Table-1: Description of variables

Variables	Sex	Mean (SD)
Age (years)	Male	37.34 (14.57)
	Female	35.09 (12.05)
Height (cm)	Male	157.92 (5.74)
	Female	150.57 (6.49)
Weight (kg)	Male	56.23 (12.59)
	Female	48.43 (8.34)
BMI (kg/m ²)	Male	22.52 (4.76)
	Female	21.38 (3.48)
SBP (mmHg)	Male	129.58 (20.24)
	Female	116.33 (13.05)
DBP (mmHg)	Male	83.88 (9.41)
	Female	79.81 (8.08)

It is apparent from Table 2 that higher percent of the Bhatra women (86.07) falls in the category of normotension than that of the men (61.54). However, more percent of men are affected by mild hypertension (23.08) and isolated systolic hypertension (15.38) than the women (mild hypertension: 10.13; isolated systolic hypertension: 3.8).

A higher percent of women are recorded in BMI class of underweight (16.46) and obese (13.92) than their counterpart (underweight: 10.77; obese: 3.08). Whereas, in BMI class of normal and overweight more percent of men (normal: 67.69; overweight: 18.46) are recorded than the women (normal: 56.96; overweight: 12.66) (Table 3).

Table-2: Blood pressure levels (mmHg)

Levels of BP*	Male (n=65)		Female (n=79)	
	No.	%	No.	%
Normotension	40	61.54	68	86.07
Mild hypertension	15	23.08	8	10.13
Moderate & severe hypertension	-	-	-	-
Isolated systolic hypertension	10	15.38	3	3.80

*According to WHO (1996)

Table-3: Body mass index (BMI)

BMI class*	Male (n=65)		Female (n=79)	
	No.	%	No.	%
Underweight (≤18.5)	7	10.77	13	16.46
Normal (18.5-22.9)	44	67.69	45	56.96
Overweight (23.0-24.9)	12	18.46	10	12.66
Obese (≥25.0)	2	3.08	11	13.92

*According to WHO (2000)

A gradual rise of SBP and DBP was discerned with the rise of BMI levels in both the gender. The exception of this trend is noted in case of SBP of obese men and normal women, and DBP of normal women (Table 4).

Table-4: Mean (SD) of blood pressure at different levels of BMI

BMI class*	SBP				DBP			
	Male		Female		Male		Female	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Underweight (≤ 18.5)	115.00	0.00	120.38	16.65	79.50	2.12	80.69	6.09
Normal (18.5-22.9)	122.68	16.40	112.09	9.32	81.73	9.06	77.82	7.57
Overweight (23.0-24.9)	149.58	21.94	121.50	13.39	89.33	9.61	81.80	7.43
Obese (≥ 25.0)	132.50	3.54	124.18	15.95	97.50	6.36	85.09	10.46

*According to WHO (2000)

Relationship between body mass index and blood pressure:

In order to understand the relationship between BMI and BP, the coefficient of correlation value has been calculated. Considering the values of BMI as regressor (i.e. 'x') and the values of BP as regressand (i.e. 'y') the regression equations (y) of Fig. 1- Fig. 4 are as follows:

BMI vs SBP for male- $R^2 = 0.1563$: $y = 2x + 83.92$

BMI vs DBP for male- $R^2 = 0.0353$: $y = 0.442x + 73.78$

BMI vs SBP for female- $R^2 = 0.0765$: $y = 1.0361x + 94.18$

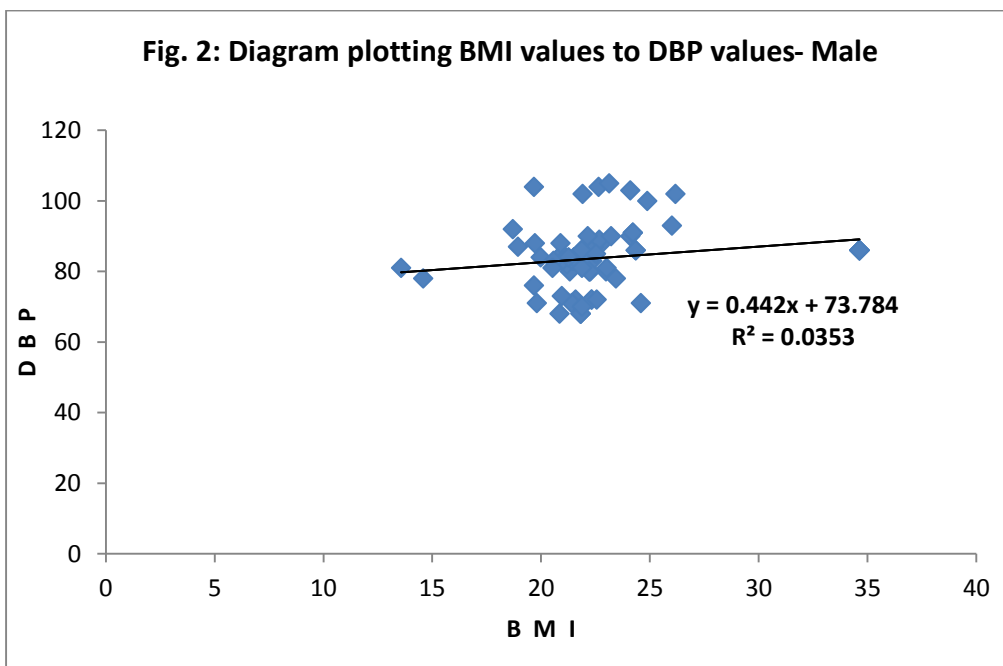
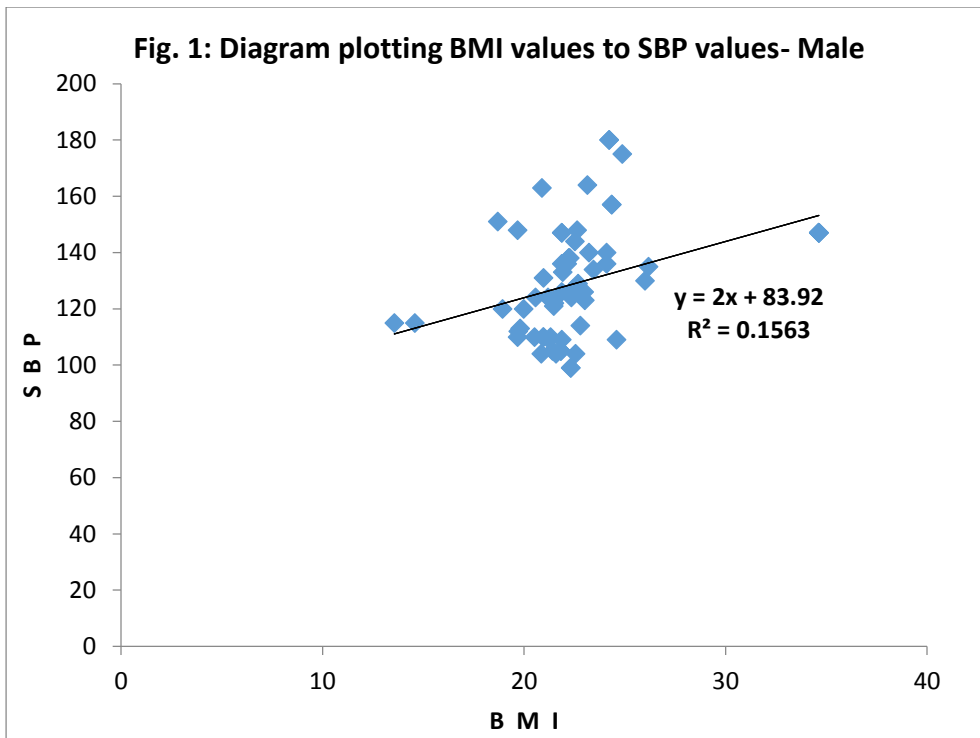
BMI vs DBP for female- $R^2 = 0.0515$: $y = 0.5267x + 68.55$

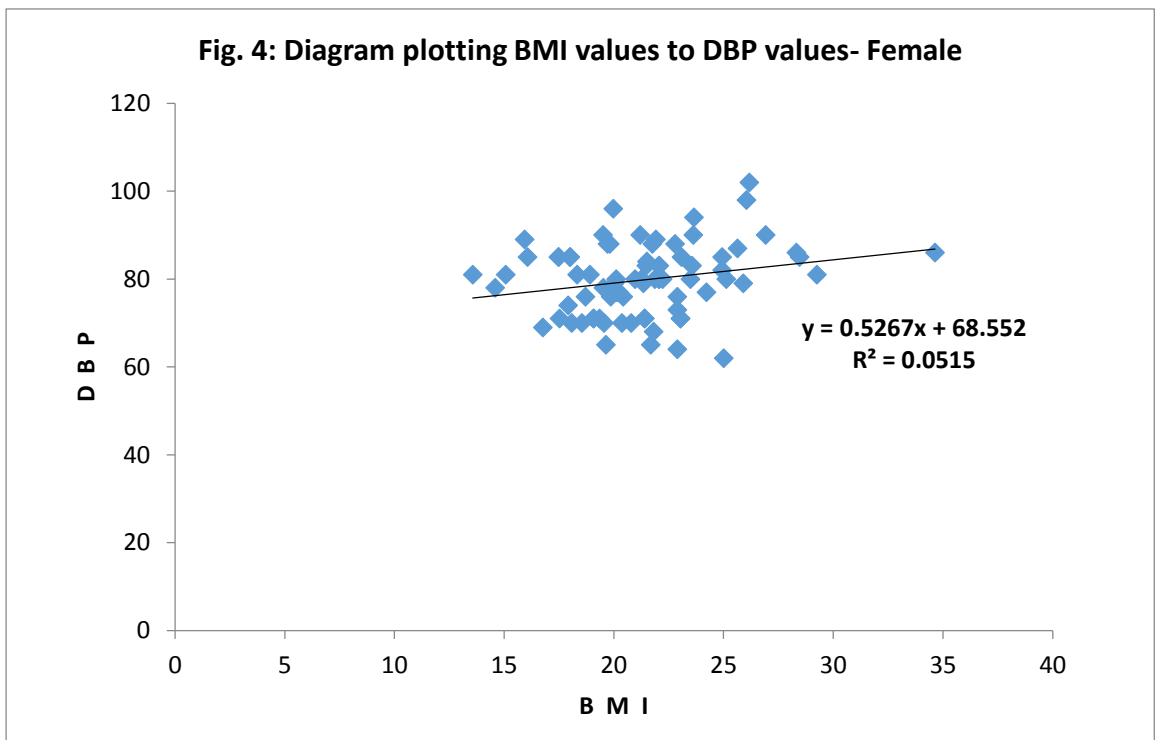
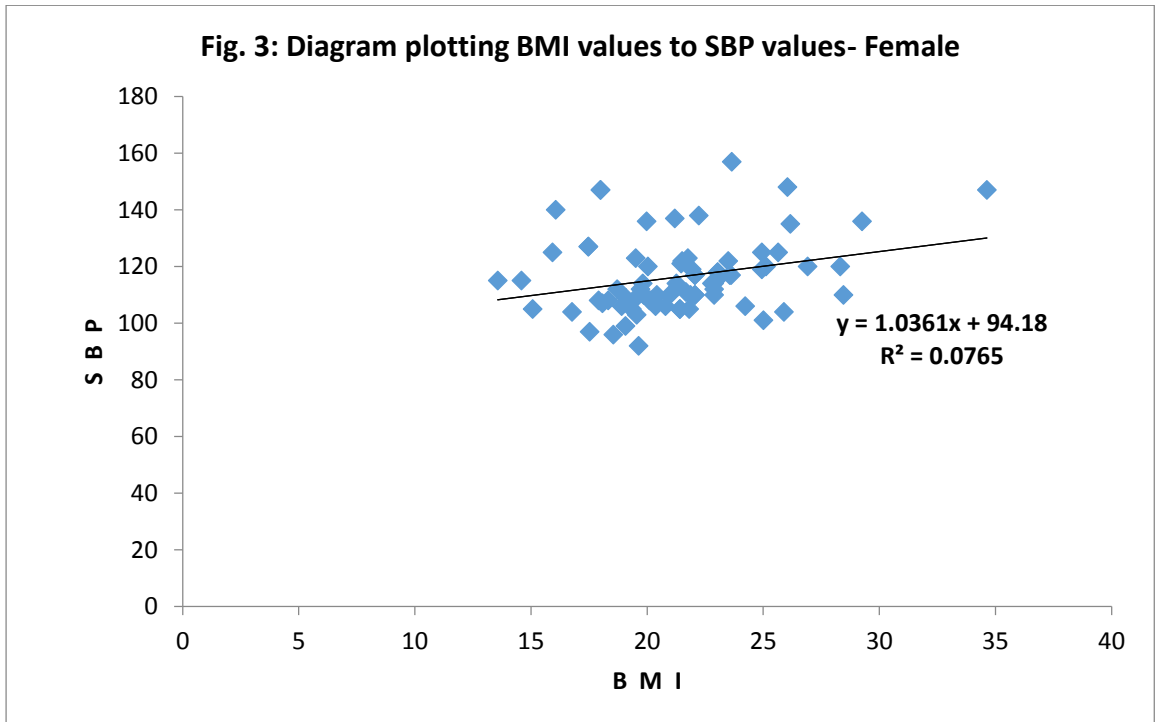
For a graphic representation the regression lines have been drawn (Fig.1-Fig. 4). These suggest that there exist a positive relationship between BMI and BP though these are of lower magnitude.

DISCUSSION

Nutritional status is an important factor determining blood pressure. In epidemiological research, understanding the relationship between BMI and BP is important (Datta Banik 2014). Tesfaye et al. (2007) reported a positive correlation between BMI and BP among adult Caucasian populations. BMI had been observed to be related with BP among adults in Sweden (Henriksson et al. 2003), China (Zhou 2002), Pakistan (Khan et al. 2008), and India (Shanthirani et al. 2003, Gupta 2004, Kusuma et al. 2004, Das et al. 2005, Desmukh et al. 2006, Gopi Chand and Rao 2007, Reddy et al. 2010 and many others cf. Datta Banik 2014).

In India in general and Chhattisgarh in particular the scheduled tribes generally lead a precarious economic life and their health status too is very poor. They generally suffer from malnutrition, high morbidity and mortality. Their miseries are indeed compounded by poverty, illiteracy and ignorance, and degrading environment.





Traditional populations around the world were generally believed to have low blood pressure (Mungreiphy et al. 2011). A high level of blood pressure is noted among the study population. This trend is corroborative of changing socioeconomic environment and blood pressure level among the Bhatra. The finding of this study is indicating a positive relationship between BMI and BP. The level of blood pressure was relatively lower both in men and women who had normal BMI in comparison with overweight and obese individuals.

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