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## Association between abo blood group and hypertension among Korku women of Betul district, Madhya Pradesh

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### Abstract

To find out the association between ABO blood group and hypertension, a cross-sectional study was carried out among 200 Korku women between reproductive age group (15-49years) from Betul district of Madhya Pradesh. Every woman was measured for anthropometric measurements, physiological parameters (pulse rate and blood pressure) & screened for ABO blood grouping followed standard protocol. The proportion of hypertensive (BP $\geq$  180 mmHg) was highest among women of A blood groups while it is found lower in women of AB blood group. The range of physiological measurements (systolic, diastolic blood pressure & pulse rate) was significantly higher among O blood group women.

**Keywords:** Blood group, reproductive age, hypertension, pulse rate

### Introduction

In today's highly competitive era, hypertension is the biggest health problem. Hypertension is also known as high level of blood pressure (SBP  $\geq$ 140mmHg / DBP  $\geq$  90mmHg). "Blood pressure is measured in millimeters of mercury (mm Hg) and is recorded into Systolic blood pressure (SBP is the highest pressure in blood vessels and happens when the heart contracts, or beats) and diastolic blood pressure (DBP is the lowest pressure in blood vessels in between heartbeats when the heart muscle relaxes) (WHO, 2013) [15]. There are many previous studies have been done and reveals the association between ABO blood group and certain health problems, but few of those studies have been done to find out the association of hypertension with individuals blood groups. Kaur, (2014) [5] explained that the blood group O is significantly associated with hypertension. Similarly, Jassim, (2012) [4] analyzed the level of total cholesterol, glucose and blood pressure (systolic/diastolic) were significantly high in individuals with O blood group than others. Tiwari, (2008) [12] found that smoking is significantly associated with hypertension. Deshmukh *et al.*, (2006) [6] was discussed about the significantly positive correlation between obesity indicators and systolic & diastolic blood pressure. Kumar and Gautam (2015) [7] found in his study that the blood pressure is determined by age, body fat, BMI, body weight, height and BMR. They also reported that the waist circumference, hip circumference as well as skin fold and body fat also have significant stake in BMI; whereas the other somatometric and physiological characteristics have meager role in deciding the BMI among bidi workers. Verma *et al.*, (2015) [14] discussed in his study that the mean body mass index, body fat percentage, waist circumference and waist hip ratio was significantly higher among hypertensive person. Such kind of studies are useful to understand the correlation between blood group and hypertension risk & also helpful to cure/identify the problems. According to WHO (2013) [15], worldwide every year 9.4 million persons were died due to complications of hypertension. Most of the studies have been carried out on heterogeneous population. Tribal population groups of India provide a unique opportunity for study regarding association of genetical markers with the physiological parameters due to their natural environmental conditions which has not come under the impact of modernization and acculturation (Basu, 1986). Kumar and Gautam (2016) [8] have conducted nutritional study among Scheduled caste women of District Banda. They found that among educated women, the BMI is largely influenced by anthropometric (body weight, arm circumference, hip

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circumference, waist circumference) and physiological (body fat percentage, BMR, total energy expenditure and adiposity index) determinants; whereas it is least influenced by socio-demographic variables.

So, it was aimed to examine the association between genetical markers i.e., ABO blood group and hypertension in Korku women of Betul district, Madhya Pradesh.

The Korku is a one of the scheduled tribe (ST) community and predominantly found in the East Nimar, Betul and Chhindwara districts of Madhya Pradesh. Korkus have derived their name from the combination of the word 'korku' meaning man and 'ku' which makes it plural meaning tribal men. The total population of Korkus is 1, 38, 798 in Betul district which was only 2.4% of total Korku population of Madhya Pradesh (5, 59, 344) (TRI Bhopal, 2014) [13]. Rare study has been carried out among Korku Tribal women regarding their biosocial aspects (Raikwar, R. & Sharma, K.K.N.:2015, and Raikwar, R. & Sharma, K.K.N.:2016) [10, 11]

### Methodology

The present study has been conducted among 200 Korku women of reproductive age (15-49 years of age) of Betul district, Madhya Pradesh. The concerned data had been collected from its predominated villages, viz. Behda, Batlakurd, Neemkheda, Borkund, Dhabda, Bichhutekri and Veerapur. Every woman measured for nutrition assessments indicators viz. height, weight, sitting height, chest circumference and for measurements physiological measurements like pulse rate and blood pressure. They also screened for the determination of ABO blood groups followed standard protocol. Body Mass Index (BMI) of every woman has calculated and categorized as per WHO. Among them the level of blood pressure was categorised using JNC-VII classification.

### Results and Discussions

Cross tabulation between genetic marker (ABO blood group) and level of blood pressure is presented in the table 1. Table 1 show that a total of 200 women were screened for blood group and blood pressure. Out of them 17% are hypertensive and 41.5% were found as pre-hypertensive as well as normal 41.5%. The prevalence of pre-hypertension was maximum in women having blood group B (15%) comparatively women of A blood group (11%), O blood group (10.5%) and in blood group AB (5%). Similarly the percentage of hypertension was higher in women of A blood group (6%) followed by women of B blood group (5%), O blood group (4%) and AB blood group (2%). Average and deviation of variables of

reproductive age group of women with respect to their ABO blood group is display in Table 2. It is reveals from the table -2 that the woman of O blood group was taller ( $153.06 \pm 5.15$ cm) than others, whereas women with B blood group heavier ( $46.74 \pm 5.50$  kg) then their counterpart whereas, sitting height varies from women of blood group A ( $77.39 \pm 2.95$ cm) to women of O blood group ( $77.31 \pm 3.00$ cm). Similarly, chest circumference was highest among women of blood group AB ( $82.99 \pm 6.49$  cm). Further the physiological measurements vary among different ABO blood groups. On the basis of body mass index (BMI) all of them were found as normal ( $BMI > 18.5 \text{ kg/m}^2$ ) and its stage was more chronic ( $BMI < 18.5 \text{ kg/m}^2$ ) among women of O blood groups. Further the pulse rate was found as normal to athletes range (84 beats/min.) among all these studied women. During investigation of field work, entire studied women have normal level of pulse rate. It varies between normal to athletes ranges. On an average, all the women have normal level of blood pressure (systolic and diastolic) (120/80 mmHg). The level of blood pressure, varies on the basis of their different types of ABO blood group. Finding reveals that the level of blood pressure (systolic/diastolic) more tending toward pre-hypertensive among women of O blood group ( $126.34 \pm 14.09 / 79.23 \pm 11.38$  mm/Hg) as compare to other women of A, B AB blood group women.

It is reveals from the Table 3 that there is no significant difference was found among women whose blood group was O and other women having other blood groups (A, AB and B blood group) on their morpho-physiological characteristics except their pulse rate. It has been observed that women of O blood group ( $84.71 \pm 16.82$ ) were having high pulse beat rate as compare to other blood groups women ( $84.29 \pm 16.44$ ) per minute.

### Conclusion

On the basis of t-test there is no difference was found among O blood group women and other blood groups (A, B and AB) as per their morpho-physiological characters and their body weight not having any influence for the determination of systolic and diastolic blood pressure. Only pulse rate was statistically significant which was higher in women having O blood group followed other blood groups i.e.: A, B and AB.

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**Table 1:** Distribution of ABO Blood Groups and blood pressure

Blood Group (N)	Level of Blood pressure (mmHg)		
	Normal N (%)	Pre-hypertensive N (%)	Hypertensive N (%)
A (64)	30 (15%)	22 (11%)	12 (6%)
B (76)	36 (18%)	30 (15%)	10 (5%)
AB (19)	5 (2.5%)	10 (5%)	4 (2%)
O (41)	12 (6%)	21 (10.5%)	8 (4%)
Total (200)	83 (41.5%)	83 (41.5%)	34 (17%)

**Table 2:** Average and standard deviation of anthropometric and physiological measurements among individuals of different blood groups

Physiological Measurements	Individuals of different blood groups			
	A (N=64) Mean $\pm$ S.D	B (N=76) Mean $\pm$ S.D	AB (N=19) Mean $\pm$ S.D	O (N=41) Mean $\pm$ S.D
Height (cm)	152.95 $\pm$ 5.14	152.95 $\pm$ 5.14	152.98 $\pm$ 5.14	153.06 $\pm$ 5.15
Weight (cm)	46.71 $\pm$ 5.49	46.74 $\pm$ 5.50	46.60 $\pm$ 5.48	46.5 $\pm$ 5.51
Sitting height (cm)	77.39 $\pm$ 2.95	77.36 $\pm$ 2.98	77.36 $\pm$ 2.94	77.31 $\pm$ 3.00
Chest circumference (cm)	82.88 $\pm$ 6.42	82.91 $\pm$ 6.41	82.99 $\pm$ 6.49	83.22 $\pm$ 6.52
Pulse rate (beats/minute)	84.32 $\pm$ 16.48	84.25 $\pm$ 16.47	84.28 $\pm$ 16.58	84.71 $\pm$ 16.82
BMI ( $\text{kg/m}^2$ )	19.96 $\pm$ 2.11	19.97 $\pm$ 2.12	19.90 $\pm$ 2.07	19.83 $\pm$ 6.52
Systolic blood pressure (mm Hg)	125.84 $\pm$ 13.83	125.87 $\pm$ 13.80	126.02 $\pm$ 13.80	126.34 $\pm$ 14.09
Diastolic blood pressure (mm Hg)	79.09 $\pm$ 11.02	79.09 $\pm$ 11.02	79.13 $\pm$ 11.31	79.23 $\pm$ 11.38

\*N is the number of women of reproductive age group (15-49) year of age

**Table 3:** Student sample *t*-test for different morpho-physiological characteristics among women of O blood group and other blood group

Morpho-physiological characteristics	O blood group (Mean $\pm$ S.D)	Other blood group (Mean $\pm$ S.D)	F value	p - Value
Height (cm)	152.8 $\pm$ 5.23	152.94 $\pm$ 5.13	.065	.799
Weight (cm)	46.5 $\pm$ 5.51	46.73 $\pm$ 5.49	.009	.923
Sitting height (cm)	77.31 $\pm$ 3.00	77.36 $\pm$ 2.98	.177	.674
Chest circumference (cm)	83.22 $\pm$ 6.52	82.89 $\pm$ 6.41	.034	.854
Pulse rate (beats/minute)	84.71 $\pm$ 16.82	84.29 $\pm$ 16.44	4.760	.030*
BMI (kg/m <sup>2</sup> )	20.25 $\pm$ 1.6	19.97 $\pm$ 2.11	2.962	0.087
Systolic blood pressure (mm Hg)	126.34 $\pm$ 14.09	125.80 $\pm$ 13.80	0.782	0.378
Diastolic blood pressure (mm Hg)	79.23 $\pm$ 11.38	79.06 $\pm$ 11.18	.421	0.517

\*Significant ( $p=0.05$ )

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