

# To Determine and Correlate the Chronic Periodontitis Status and Blood Groups in Two Major Ethnic Groups of Indian Population

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## ABSTRACT

### BACKGROUND

Periodontal diseases are very prevalent among large populations worldwide. They have multi-factorial aetiology. Some researchers have concluded that these diseases have genetic predisposition along with other systemic diseases. However, if such a relationship between blood groups and periodontal disease can be established beyond a reasonable doubt, it can be concluded that the presence of particular blood group antigen has somehow increased the susceptibility to the disease. The present study was planned to be conducted on two major ethnic groups of Indian population to correlate the relationship between chronic periodontitis and ABO blood groups.

### METHODS

A cross-sectional study was conducted among 500 systemically healthy patients with chronic periodontitis who were randomly selected from the two major ethnic groups of Indian population, in the age group of 25 years to 75 years of both the sexes. Each group had 250 patients. Group I: 250 North Indian (NI) patients with Chronic Periodontitis; Group II: 250 South Indian (SI) patients with Chronic Periodontitis. Both the population groups were divided into five age groups: a. 25-35 years, b. 36-45 year's c. 46-55 years, d. 56-65 years, e. 66-75 years. Their blood samples were taken through finger prick method to analyse ABO blood groups and Rh factor. The obtained data was analysed for frequency distribution and statistical significance.

### RESULTS

It was observed that in both the population groups, maximum individuals having chronic periodontitis belonged to B+ blood group, which was followed by O+>A+>AB+. There was very less prevalence of Rh-negative blood group patients in both the population groups.

### CONCLUSIONS

Individuals having B+ blood group are more likely to have chronic periodontitis followed by O+>A+>AB+.

### KEY WORDS

Chronic Periodontitis, Blood Groups, Prevalence

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**BACKGROUND**

Periodontal disease is a highly prevalent disease with a multifactorial aetiology, affecting a large population worldwide. Although bacteria are the main cause of inflammatory periodontal disease, there is increasing evidence that host factors, such as diabetes, smoking and genetic predisposition, contribute to the clinical appearance, distribution of lesions and severity of destruction in each individual. Bacteria may cause indirect periodontal tissue destruction by activating various components of the host defence system, on activation these host systems may provide protection at the cost of some periodontal destruction. Periodontal researchers have studied this double-edged sword phenomenon and the concepts thus derived consider the involvement of intrinsic and induced host factors.<sup>1</sup> However, if such a relationship between blood groups and periodontal disease can be established beyond a reasonable doubt, it can be concluded that the presence of particular blood group antigen has somehow increased the susceptibility to the disease. The term "blood group" refers to the entire blood group system comprising red blood cell (RBC) antigens whose specificity is controlled by a series of genes which can be allelic or linked very closely on the same chromosome. "Blood type" refers to a specific pattern of reaction to testing antisera within a given system. Over a period of time, our understanding on blood groups has evolved to encompass not only transfusion-related problems but also specific disease association with RBC surface antigens.<sup>2</sup> Karl Landsteiner discovered the fundamental principles of blood grouping in 1900s. He described the blood groups according to "ABO" blood typing system. Landsteiner classify people into one of the four groups A, B, O, and AB. According to his definitions cells either had A or B antigens or neither A nor B (later named group O). The fourth group AB, in which both antigens are present on red cells and the serum contains neither anti-A nor anti-B antibodies.<sup>3</sup> The Rh system was discovered in 1940 by Landsteiner and Wiener. It is a type of protein or antigen on the surface of red blood cells. The terms Rhesus positive or Rh positive and Rhesus negative or Rh negative was given accordingly. Since then, ABO system and the Rh system are the most commonly used blood grouping systems.<sup>4</sup>

In India and Western countries, many workers have tried to find out the relationship between ABO blood group and various systemic diseases, and the results showed that some diseases like salivary gland tumors<sup>5</sup>, chicken pox<sup>6</sup>, malaria<sup>7</sup>, haematological malignancies<sup>8</sup>, ischemic heart

A plethora of studies have been conducted in the field of medicine. Surprisingly, very less number of studies have been conducted to determine the relationship between ABO blood group and incidence of oral and dental diseases. Some researchers claimed that there was a relationship, whereas some others could not find any, which could be attributed to the geographic diversity in the population groups. It is well known that periodontal diseases have high incidence in Indian population. Although bacterial plaque is considered the primary extrinsic etiologic agent in periodontal diseases, our purpose of this study was to describe whether there is a relationship between chronic periodontitis and ABO blood groups in two major ethnic groups of Indian Population.

**METHODS**

This is a cross-sectional study, conducted among 500 healthy patients with chronic periodontitis, randomly selected from the two major ethnic groups of Indian population in the age group of 25 years to 75 years of both the sexes. Prevalence of disease was used to determine the sample size. Ethical committee of the institution also approved this sample size.

**Group I:** 250 North Indian (NI) patients with Chronic Periodontitis. **Group II:** 250 South Indian (SI) patients with Chronic Periodontitis. Both the population groups were divided into five age groups: a. 25-35 years, b. 36-45 years c. 46-55 years, d. 56-65 years, e. 66-75 years. These age groups were used as per the master article and in WHO surveys these age groups were used

**Population Description**

The inclusion of individuals into the two ethnic groups, North Indian (NI) and South Indian (SI) was on the basis of individual's name, place of birth, mother tongue and self-identification. Also, the individual's family tree was assessed for the two-generation upwards, both on maternal and paternal side for any inter- race associations.<sup>9</sup> The idea behind relating the ethnicity with name was that although given names may vary, but surnames can be traced to the North Indian or South Indian ethnicity. Also the mother tongues of both the ethnic groups vary with SI group having Dravidian languages like Tamil, Telugu, Kannada and Malayalam as mother tongue whereas NI group had Hindi, Punjabi, Gujarati and Bengali etc. as mother tongue.<sup>10</sup> The role of self- identification and tracking the family tree was somewhat reliable method of accessing an individual racial background. Correlating all these findings in an individual, a decision of inclusion into NI and SI group was made.

**Inclusion Criteria**

Subject had minimum 20 teeth present. 2. Subject had not undergone any periodontal treatment within the previous 6 months. 3. Subject had not used antibiotics within the previous 3 months. 4. Subject had not any systemic disease. 5. Subjects who were willing to participate in the study and had signed informed consent.

**Exclusion Criteria**

Pregnant women, lactating mothers and smokers were excluded from the study.

**Periodontal Examination**

Full mouth examinations were conducted for all the patients. Four sites were examined for each tooth (Mesiobuccal, distobuccal, buccal, lingual). Probing Pocket Depth (PPD) was recorded using a marked periodontal probe (William's Probe, Hu-Friedy, Chicago, IL, USA). Patients who had exhibited >30% sites with probing pocket depth  $\geq$ 5 mm were diagnosed as chronic periodontitis patients.<sup>11</sup>

**Blood Analysis**

Blood was collected from each subject, and analysed for determination of ABO blood group and Rh factor. All blood samples were collected by a sterile finger prick with a disposable lancet. The blood grouping and Rh factor investigation was carried out by slide method. In this method

white porcelain tile was divided into three parts, as for each part, a drop of donor blood was mixed with anti-A, anti-B and anti-D separately. The agglutination or blood clumping pattern was visually observed from which the ABO and Rhesus (RhD) type of blood group was determined for each patient. This test was less time consuming and inexpensive as it requires only a small volume of blood typing reagents<sup>12</sup>.

**Statistical Analysis**

Formula for determining sample size-

$$N = 4PQ/d^2$$

Where, N=sample size, P= Prevalence (from previous studies)<sup>13</sup>, Q= 100-P, d = allowable error (5-20% of P),  $N = 4 \times 0.4 (1-0.4)/(0.05)^2$ , N= 384

Frequency distribution was used along with the chi-square test and p value analysis.

**RESULTS**

	Blood Group & Rh Factor	Male	Male %	Female	Female %
1	A+	32	24.06	24	23.30
2	B+	46	34.58	37	35.92
3	AB+	21	15.78	14	13.59
4	O+	34	25.56	28	27.18
	<b>Total</b>	<b>133</b>		<b>103</b>	
5	AB-	1	20	1	11.11
6	B-	1	20	1	11.11
7	O-	0	0	0	
8	A-	3	60	7	77.77
	<b>Total</b>	<b>5</b>		<b>9</b>	
	<b>Grand Total</b>	<b>133+5=138</b>		<b>103+9=112</b>	

**Table 1. Percentage Distribution of ABO Blood Groups and Rh Factor among Male and Female Patients of Chronic Periodontitis in North Indian Population Group**

Table 1 shows that in North Indian population group there were 138 Males and 112 Females. Out of them 133 males and 103 females were Rh Positive whereas 5 males and 9 females were Rh negative. 32 (24.06%) males and 24 (23.30%) females have A+ blood group, 46 (34.58%) males and 37 (35.92%) females were having B+ blood group. O+ blood group was shown in 34 (25.56%) males and 28 (27.18%) females which is followed by AB+ blood group with 21 (15.78%) males and 14 (13.59%) females. Results shows that only 14 patients out of 250 in North Indian population were having Rh negative blood group. 5 males and 9 females were having Rh negative blood group. 3 (60%) males and 7 (77.77%) females have A- blood group. B- and AB- have equal 1 (20%) male and 1 (11.11%) female patients. There was no male and female with O- blood group in this population.

Table 2 shows that in South Indian population group there were 146 Males and 104 Females. Out of them 141 males and 104 females were Rh Positive. 29 (20.56%) males and 19 (18.26%) females have A+ blood group, 56(39.71%) males and 43 (41.34%) females were having B+ blood group. O+ blood group was shown in 45 (31.91%) males and 34 (32.69%) females which is followed by AB+ blood group with 11 (7.80%) males and 8 (7.69%) females.

Results shows that only 5 patients out of 250 in North Indian population were having Rh negative blood group. 5 males and no females were having Rh negative blood group. 3

(60%) males have B- blood group and 2 (40%) males have A- blood group. There was no male patient with O- and AB- blood group in this population. Table 3 shows correlation of ABO blood groups in North and South Males population in five different age groups. In age group 25 years to 35 years there were 24 North Indian male patients out of them 6 were having A+ blood group again 6 have B+, 5 have AB+ and 7 were having O+ blood group. There were 4 South Indian male patients out of them 1 was having A+ blood group again 1 have B+ blood group and 2 have O+. There were no patients with AB+ blood groups.

	Blood Group & Rh Factor	Male	Male %	Female	Female %
1	A+	29	20.56	19	18.26
2	B+	56	39.71	43	41.34
3	AB+	11	7.80	8	7.69
4	O+	45	31.91	34	32.69
	<b>Total</b>	<b>141</b>		<b>104</b>	
5	AB-	0	0	0	0
6	B-	3	60	0	0
7	O-	0	0	0	0
8	A-	2	40	0	0
	<b>Total</b>	<b>5</b>		<b>0</b>	
	<b>Grand Total</b>	<b>141+5=146</b>		<b>104</b>	

**Table 2. Percentage Distribution of ABO Blood Groups and Rh Factor among Male and Female Patients of Chronic Periodontitis in South Indian Population Group**

Age Group	North A+	South A+	North B+	South B+	North AB+	South AB+	North O+	South O+
25-35	6	1	6	1	5	0	7	2
36-45	11	12	15	22	2	5	8	15
46-55	9	11	11	17	4	3	10	20
56-65	6	5	12	14	10	2	5	8
66-75	0	0	2	2	0	1	4	2

**Table 3. Correlation of ABO Blood Groups in North- and South-Indian Male Population in Different Age Groups**

In age group 36 years to 45 years, there were 36 North Indian male patients out of them 11 patients with A+ blood group, 15 were having B+ blood group, 2 were having AB+ blood group and 8 were having O+ blood group. There were 52 South Indian male patients out of them 12 patients were having A+ blood group, 22 were having B+ blood group, 5 were having AB+ blood group and 13 were having O+ blood group. In age group 46 years to 55 years, there were 34 North Indian male patients out of them 9 patients with A+ blood group, 11 were having B+ blood group, 4 were having AB+ blood group and 10 were having O+ blood group. There were 51 South Indian male patients out of them 11 patients with A+ blood group, 17 were having B+ blood group, 3 were having AB+ blood group and 20 were having O+ blood group. In age group 56 years to 65 years, there were 33 North Indian male patients out of them 6 patients with A+ blood group, 12 were having B+ blood group, 10 were having AB+ blood group and 5 were having O+ blood group. There were 29 South Indian male patients out of them 5 patients with A+ blood group, 14 were having B+ blood group, 2 were having AB+ blood group and 8 were having O+ blood group. In age group 66 years to 75 years, there were 6 North Indian male patients out of them 2 patients with B+ blood group, 4 were having O+ blood group. There were no patients with A+, AB+ blood groups. There were 5 South Indian male patients out of them 2 patients with B+ blood group, 1 was having AB+ blood group and 2 were having O+ blood group. There was

statistically significant difference in all the age groups of both North Indian and South Indian males in AB+ blood group ( $p=0.030$ ).

Age Group	North A+	South A+	North B+	South B+	North AB+	South AB+	North O+	South O+
25-35	4	0	9	4	3	0	4	2
36-45	7	9	11	16	5	5	7	13
46-55	10	7	7	17	4	2	10	8
56-65	2	3	7	5	0	1	5	8
66-75	1	0	3	1	2	0	2	3
	Chi-square= 5.472, p-value=.242		Chi-square= 7.94, p-value=.093		Chi-square= 5.435, p-value=.246		Chi-square= 3.029, p-value=.553	

**Table 4. Correlation of ABO Blood Groups in North- and South-Indian Female Population in Different Age Groups**

Table 4 shows Correlation of ABO blood groups in North and South Females population in five different age groups. In age group 25 years to 35 years there were 20 North Indian female patients out of them 4 were having A+ blood group, 9 have B+, 3 have AB+ and 4 were having O+ blood group. There were 6 South Indian female patients out of them 4 were having B+ blood group and 2 have O+ blood group. There were no patients with A+ and AB+ blood groups.

In age group 36 years to 45 years, there were 30 North Indian female patients out of them 7 patients with A+ blood group, 11 were having B+ blood group, 5 were having AB+ blood group and 7 were having O+ blood group. There were 43 South Indian female patients out of them 9 patients with A+ blood group, 16 were having B+ blood group, 5 were having AB+ blood group and 13 were having O+ blood group. In age group 46 years to 55 years, there were 31 North Indian female patients out of them 10 patients with A+ blood group, 7 were having B+ blood group, 4 were having AB+ blood group and 10 were having O+ blood group. There were 34 South Indian female patients out of them 7 patients with A+ blood group, 17 were having B+ blood group, 2 were having AB+ blood group and 8 were having O+ blood group. In age group 56 years to 65 years, there were 14 North Indian female patients out of them 2 patients with A+ blood group, 7 were having B+ blood group and 5 were having O+ blood group. There was no patient with AB+ blood group. There were 17 South Indian female patients out of them 3 patients with A+ blood group, 5 were having B+ blood group, 1 with AB+ blood group and 8 were having O+ blood group. In age group 66 years to 75 years, there were 8 North Indian female patients out of them 1 patient with A+ blood group, 3 were having B+ blood group, 2 were having AB+ blood group and 2 were having O+ blood group. There were 4 South Indian female patients out of them 1 patient with B+ blood group, 3 were having O+ blood group. There were no patients with A+ and AB+ blood groups. There was statistically significant difference in all the age groups of both North Indian and South Indian females in B+ blood group ( $p= 0.093$ ).

## DISCUSSION

Government of India and World health Organization conducted a multicentre oral health survey in 2004 in order to have baseline data of oral diseases along with their risk factors. Shah N in her report for the National Commission on

Macroeconomics and Health on advanced periodontal disease observed that 40% to 45% population of India is affected pocket formation and bone loss.<sup>13</sup> Ramjford et al in WHO survey done in India along with 4 other countries observed that there was 100% prevalence of periodontal disease (Including gingivitis) in India.<sup>14</sup> As we know that paradigm of pathogenesis of periodontal diseases is shifting from mere presence of microorganisms to the other host related factors which may lead to the progression of disease. Bacterial plaque is primary etiological factor in the progression of the periodontal disease, but genetic factors also have significant role in its progression. In the present study ABO blood grouping and Rh factor examination was done using slide method, which is very reliable, convenient and less expensive. Mujahid A have described this method in their study.<sup>12</sup> Blood samples were collected after obtaining the consent from each subject by finger pricking method using sterile disposable lancet. The blood grouping and Rh factor examination was done by slide agglutination method (Visual method) using combined ABD monoclonal antibodies for blood typing kit. Dhalkari CD et al,<sup>15</sup> Pai GP et al<sup>16</sup> and Kokane NB et al<sup>17</sup> have used similar blood grouping technique in their studies.

Contemporary ethnic India is a land of enormous genetic, cultural and linguistic diversity. There is an extent of confounding of geography, culture and language in distribution of ethnic groups of India. Keeping this diversity in mind the present study was designed to be conducted on two major ethnic groups of Indian population i.e. North Indian Population (NI) and South Indian Population (SI). Indian population predominantly speaks languages that belong to the Indo-Aryan or Dravidian families. The population groups of the northern Indian are Indo-Aryan speakers and those of southern Indian are Dravidian speakers. These two population groups have been the major contributors to the development of Indian culture and society.<sup>18</sup>

In the present study the participants were divided in North Indian population and South Indian population on the basis of self-identification of their own ethnicity using name, gender, age, place of origin, father's name, mother's name and even second-generation individuals, maternal grandparents name, paternal; grandparents name. This method of self-identification was described by Morning A,<sup>19</sup> Francis D,<sup>9</sup> Tang Hua et al.<sup>20</sup> Full mouth periodontal examinations (excluding third molars) was conducted for all patients. Four sites will be examined for each tooth (Mesiobuccal, distobuccal, mid-buccal, mid-lingual). This was in accordance with the study conducted by Ghamdiet al<sup>21</sup> and MahanteshaS et al.<sup>22</sup> Probing Pocket Depth (PPD) was recorded using a marked periodontal probe (William's Probe, Hu-Friedy, Chicago, IL, USA). Aravind T et al<sup>23</sup> and Chatterjee A et al<sup>24</sup> have also used William's graduated probe in their similar studies. Patient who will exhibit > 30% sites with probing pocket depth  $\geq$  3 mm will be diagnosed as chronic periodontitis patients. These criteria were in accordance with the studies of Ghamdiet al<sup>21</sup>, Mortazavi H et al<sup>25</sup> and Grover V et al.<sup>11</sup>

In the present study subjects from both the sexes were included at random. The subjects from age of 25 years to 75 years who were diagnosed as chronic periodontitis patients were included in the study having been informed about the purpose and method of the study. This age group range was

in accordance with the previous studies conducted by Demir T et al,<sup>26</sup> Mortazavi H et al<sup>25</sup> and Aravind T et al.<sup>23</sup>

It was observed that maximum males among north Indian population group were having B positive blood group especially in age groups of 36-45, 46-55 and 56-65 years which was followed by O positive blood group. These results were in the line with studies conducted on north Indian population by Gautam A et al<sup>27</sup> and Kokane NB et al.<sup>17</sup> It was observed that in present study maximum males in south Indian population with chronic periodontitis among age groups of 36-45 and 45-55 years were having B positive blood group which was followed by O positive blood group in same age groups. These findings were in accordance with Mahantesha S.<sup>22</sup> It was observed that maximum females among north Indian population group were having B positive blood group especially in age groups of 36-45 and 46-55 years which was followed by O positive and A positive blood groups. These results were in the line with studies conducted on north Indian population by Gautam A et al<sup>27</sup> and Kokane NB et al.<sup>17</sup>

Results also showed that in present study maximum females in age groups 36-45 and 46-55 years of south Indian population were having B positive blood group which was followed by O positive blood group in respective age groups. This was in line with a study carried out by Ramamoorthy B et al.<sup>28</sup> Although in both the study population groups, we have observed that there was a positive correlation between the periodontal disease and age this may be due to the cumulative effects of other disease conditions and prolonged exposure of periodontium to periodontal pathogens. Moreover it was observed that in both the population groups there was higher prevalence of chronic periodontitis in men when compared to women, this may be attributed due to the more use of tobacco chewing or smoking by men when compared to women.

Demir T et al<sup>29</sup> conducted the study to determine whether the bacteria isolated from inside periodontal pockets of individuals with periodontal disease showed differences in the number of CFU (Colony Forming Units) in different ABO blood groups. The results of their study showed that all bacteria were inclined to reproduce more in B subgroups in general which was followed by A subgroup and those reproduced less in AB and O groups.

### CONCLUSIONS

There is a relation between ABO blood groups and periodontal diseases. Individuals having B+ blood group are more likely to have chronic periodontitis followed by O+>A+>AB+.

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