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ABH Secretor and Non - Secretor Status among Four Varna Population of Lucknow (Uttar Pradesh, India)

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Abstract: ***There are variations in the distribution of secretors and non- secretors in relation to ABO blood as both inherited independently. This study was carried out to determine the secretor status among Brahmin, Kshatriya, Vaishya and Shudra population of Lucknow and discussed it with reference to genetic variability. Blood and saliva samples were collected during the period between January 2010 to February 2011 from each of the 400 individuals (200 men and 200 women) who participated in this study. ABO blood grouping was done using standard tile and tube methods and secretor status was determined by haemagglutination inhibition test. It is apparent from the results that secretors are much more preponderant in all the four Varna.The proportions of non secretors in the men exceed that of the women. It clearly indicates that secretors are more common among individuals belonging to blood group 'B'. The next higher frequency of secretors is noted among those belonging to blood group ' A' followed by ' O' and ' AB' irrespective of the sex and the population groups.***
Key Words: ABH Secretor status, Saliva, Inhibition test , Blood group, Varna.

I. INTRODUCTION

As investigators studies the blood groups from various angles it was discovered that some persons have A or B antigens in the body secretions (from eye, nose, salivary glands, and mammary glands) as well as the RBCs. Those with this characteristic are known as secretors and can be identified even by a bit of dried saliva which would remain on an envelope that had been licked or by cigarette butt. It was distinguished by mixing the secretion with serum which contains antibodies for A or B antigens. If the antigen is present in the secretion it will react with and neutralize the antibodies and the serum will lose its ability to agglutinate cells bearing A or B antigens. A chemical explanation has been found for secretor trait. Persons who are secretors have water soluble antigens and therefore, some of these pass out into the body secretions.

The non-secretors on the other hand, have antigens which are only alcohol soluble and cannot be dissolved out in the secretions which are aqueous. Thus, the secretors can be identified by tests on the blood as well as on the body secretions. The ability to secrete those antigens is due to a dominant gene ‘Se’, with the recessive allele, ‘se’ representing the non secretor condition. (Winchester, 1966)

The inheritance of group specific substances has been clearly understood to be inherited by a pair of allelomorphic genes, ‘Se’ and se’ (Stern, 1968). Besides, Lewis blood group system is another polymorphic condition intimately related to secretor gene and the ABO system. Since, the secretion phenomenon is known to follow simple Mendilian principles, we can easily get a genetic picture of population under study.

Significant associations have been shown to exist between secretor status and certain diseases. Clarke et al. (1956) showed a strong association between non-secretion and both duodenal and gastric ulceration. In rheumatic heart disease and acute rheumatic fever the frequency of nonsecretors is raised (Mourant et al., 1978). Wiener et al. (1960) among others have shown that in those cases where the secretor status of infants suffering from ABO haemolytic disease has been ascertained, there is a marked deficiency of ABH non-secretors as compared with the general population.

A selection-relaxation hypothesis has been proposed by Bhalla (1990) to account for the sustained high frequency of non-secretors in the advanced human societies as opposed to the low frequency of recessive allele (ABH*se) diminishing to zero in many primitive human socieities and its complete absence in apes and monkeys. He suggested a protective role of secreted blood group substances against the deleterious effects of lectins in gastric mucosa. A quite wide range of frequencies for ABH*Se allele is observed from the Indian region from where a good number of studies are now available.

In India, ABH*Se allele frequency is 0.524 in general among different population groups of India. From various zones the frequency of ABH*Se allele is high from South India (0.589) and Islands (0.579) and low from Central India (0.467). The high

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frequency of ABH*Se allele is observed among castes (0.555) and low among scheduled tribes (0.495). From the Himalayan region, high frequency of this allele is observed in Eastern region (0.589). There are wide differences in the distribution of ABH*Se allele in India primarily due to the ethnic diversity of its people derived from autochthonous (Pre-Dravidian), Caucasoid (Dravidian and Aryan) and Mongoloid racial elements (Bhasin and Walter, 2001).

A. About Area and People

The present study is conducted among the four Varna population of Lucknow district of Uttar Pradesh. Lucknow is the largest and most developed city in north India after Delhi. It is situated in the middle of the Gangetic plain. It is located at 26.84 latitude and 80.92 longitude and situated at elevation 126 meters above of sea level. The areas selected for field work from Lucknow were Gomti Nagar, Alambagh, Aliganj, Bakshi Ka Talab, Telibagh, Chowk, Qaiserbagh, Aminabad and Rajaji Puram.

B. Materials and Methods

Four hundred individuals were randomly selected from four Varna population viz; Brahmin (n= 100), Kshatriya (n=100), Vaishya (n=100) and Shudra (n=100). In which 50 percent men and 50 percent women individuals were selected.

In order to find out the secretor status of the subject, saliva specimens were collected with the help of a cotton swab. Each subject was requested to put the cotton swab under his/her tongue for some time and once the cotton got completely soaked, the subject was requested to squeeze it in a test tube with the help of a broad forcep. This way about 0.5 to 1ml saliva was collected from each subject.

The collected saliva sample were heated in a water bath at 100 ºC for about 75 minute to inactivate the enzymes and allied biologically active constituents present in the saliva which would have otherwise destroyed the group specific substance present in saliva. After putting the saliva in frig till 24 hours and it was centrifuged at 2500 ± 500 r.p.m. for 3 minutes. This enabled the suspending mucus and slimy materials of the saliva constituent along with the inactivated solutes to separate and settle down in the tube. The clear supernatant liquid was pipettes out of test. Supernatant was collected and diluted with an equal volume of normal saline to detect the ABH secretor status using hemagglutination inhibition method.

II. RESULT AND DISCUSSION

Results of the secretor status analysis are given in Table – 01. It is apparent from the table that secretors are much more preponderant in all the four Varnas. The magnitude of this variation is slightly higher in the Kshatriyas where non-secretor doesn't exceed 38 per cent (secretors 62%) whereas its least frequency is noted in Brahmins (58%).

Table – 01: Secretor status among four Varnas

Four Varna	Sex	No.	Secretor		Non Secretor	
			No.	%	No.	%
Brahmin	*Male*	50	28	56	22	44
	Female	50	30	60	20	40
	M + F	100	58	58	42	42
Kshatriya	*Male*	50	30	60	20	40
	Female	50	32	64	18	36
	M + F	100	62	62	38	38
Vaishya	*Male*	50	29	58	21	42
	Female	50	31	62	19	38
	M + F	100	60	60	40	40
Shudra	*Male*	50	26	52	24	48
	Female	50	33	66	17	34

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	M + F	100	59	59	41	41

The phenotypic distribution and percentage of homozygous and heterozygous secretors and non-secretors are given in Table – 02. In both the sexes belonging to the four populations, the proportion of heterozygous secretors 'Se se' exceeds the homozygous ones 'Se Se' and 'se se'.Proportion of heterozygous individuals in both the sexes is nearly the same. However, the proportions of non-secretors in the males exceeds that of the females. (Table – 02 & 03).

Table – 02: Homo and Heterozygosity of secretor status among four Varnas

Four Varna	Sex	Se^2 (Se Se)	%	2Se se	%	se^2 (se se)	%
Brahmin	*Male*	0.1133	11.33	0.4467	44.67	0.4399	43.99
	Female	0.1351	13.51	0.4650	46.50	0.3999	39.99
	M + F	0.1239	12.39	0.4561	45.61	0.4199	41.99
Kshatriya	*Male*	0.1351	13.51	0.4650	46.50	0.3999	39.99
	Female	0.1600	16.00	0.4800	48.00	0.3600	36.00
	M + F	0.1471	14.71	0.4730	47.30	0.3799	37.99
Vaishya	*Male*	0.1238	12.38	0.4562	45.62	0.4200	42.00
	Female	0.1471	14.71	0.4730	47.30	0.3799	37.99
	M + F	0.1351	13.51	0.4650	46.50	0.3999	39.99
Shudra	*Male*	0.0943	09.43	0.4257	42.57	0.4799	47.99
	Female	0.1738	17.38	0.4861	48.61	0.3400	34.00
	M + F	0.1293	12.93	0.4607	46.07	0.4099	40.99

Se and se are dominant and recessive alleles of ABH secretion

Table – 03: Secretor phenotype and genotype frequencies among four Varnas

Four Varna	Sex	Phenotypic Frequency		Gene Frequency	
		Secretor	Non-secretor	Secretor (Se Se)	Non-secretor (se se)
Brahmin	*Male*	0.5600	0.4400	0.6633	0.3367
	Female	0.6000	0.4000	0.6324	0.3676
	M + F	0.5800	0.4200	0.6480	0.3520
Kshatriya	*Male*	0.6000	0.4000	0.6324	0.3676
	Female	0.6400	0.3600	0.6000	0.4000
	M + F	0.6200	0.3800	0.6164	0.3836
Vaishya	*Male*	0.5800	0.4200	0.6481	0.3519
	Female	0.6200	0.3800	0.6164	0.3836
	M + F	0.6000	0.4000	0.6324	0.3676
Shudra	*Male*	0.5200	0.4800	0.6928	0.3072
	Female	0.6600	0.3400	0.5831	0.4169
	M + F	0.5900	0.4100	0.6403	0.3597

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Se and se are dominant and recessive alleles of ABH secretion

The current distribution of secretors and non-secretors in the four Varna populations under consideration was computed against the ABO blood groups (Table 04 a & b). It clearly indicates that secretors are more common among individuals belonging to blood group 'B'. The next higher frequency of secretors is noted among those belonging to blood group 'A' followed by 'O' and AB' irrespective of the sex and the population groups.
Thus, in so far as the present sample is considered it is noted that the four Varnas under consideration exhibit a similar pattern of phenotypic variations as regards the secretor phenotypes.

Table-04a: Association of ABO Blood groups with the (O) secretion in saliva among four Varnas of Lucknow in terms of secretor

Four Varna	Sex	Secretor									
		O		A		B		AB		Total	
		N	%	N	%	N	%	N	%	N	%
Brahmin	Male	9	60.00	4	33.33	12	66.67	3	60.00	28	56.00
	Female	5	55.56	9	52.95	14	66.66	2	66.66	30	60.00
	M+F	14	58.34	13	44.83	26	66.67	5	62.50	58	58.00
Kshatriya	Male	7	63.64	12	66.67	9	56.25	2	40.00	30	60.00
	Female	8	57.14	10	71.43	11	64.70	3	60.00	32	64.00
	M+F	15	60.00	22	68.75	20	60.60	5	50.00	62	62.00
Vaishya	Male	5	62.50	11	64.70	9	47.36	4	66.67	29	58.00
	Female	7	58.33	7	63.64	8	47.05	9	90.00	31	62.00
	M+F	12	60.00	18	64.28	17	47.22	13	81.25	60	60.00
Shudra	Male	5	62.50	9	50.00	10	47.61	2	66.67	26	52.00
	Female	8	88.89	5	45.46	12	60.00	8	80.00	33	66.00
	M+F	13	76.47	14	48.27	22	53.65	10	76.92	59	59.00

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Table-04b: Association of ABO Blood groups with the (O) secretion in saliva among four Varnas of Lucknow in terms of non-secretors

Four Varna	Sex	Non-Secretor									
		O		A		B		AB		Total	
		N	%	N	%	N	%	N	%	N	%
Brahmin	Male	6	40.00	8	66.67	6	33.33	2	40.00	22	44.00
	Female	4	44.44	8	47.05	7	33.34	1	33.34	20	40.00
	M+F	10	41.66	16	55.17	13	33.33	3	37.50	42	42.00
Kshatriya	Male	4	36.36	6	33.33	7	43.75	3	60.00	20	40.00
	Female	6	42.86	4	28.57	6	35.30	2	40.00	18	36.00
	M+F	10	40.00	10	31.25	13	39.40	5	50.00	38	38.00
Vaishya	Male	3	37.50	6	35.30	10	52.64	2	33.33	21	42.00
	Female	5	41.67	4	36.36	9	52.95	1	10.00	19	38.00
	M+F	8	40.00	10	35.72	19	52.78	3	18.75	40	40.00
Shudra	Male	3	37.50	9	50.00	11	52.39	1	33.33	24	48.00
	Female	1	11.11	6	54.54	8	40.00	2	20.00	17	34.00
	M+F	4	23.53	15	51.73	19	46.35	3	23.08	41	41.00

Table – 05: Inter Varna comparison with respect to ABH(O) secretion in saliva on the basis of Chi-square test

Sample Population Inter Varna Differences	χ^2 value	Probability	Remark
Brahmin × Kshatriya	0.3332	P<0.50	NS
Brahmin × Vaishya	0.0824	P<0.75	NS
Brahmin × Shudra	0.0204	P>0.90	NS
Kshatriya × Vaishya	0.0838	P<0.75	NS
Kshatriya × Shudra	0.1248	P>0.75	NS
Vaishya × Shudra	0.0206	P>0.90	NS

In order to xamne whether there is any difference in the distribution of phenotypic frequencies of the secretor status among the four Varnas, chi-square test was employed. It is noted that the values indicate non-significant differences at 5 per cent level (Table 05). Thus, in respect of secretor factor all the populations of four Varnas namely Brahmin, Kshatriya, Vaishya and Shudra are not distinguishable as they belong a single genetical stock.

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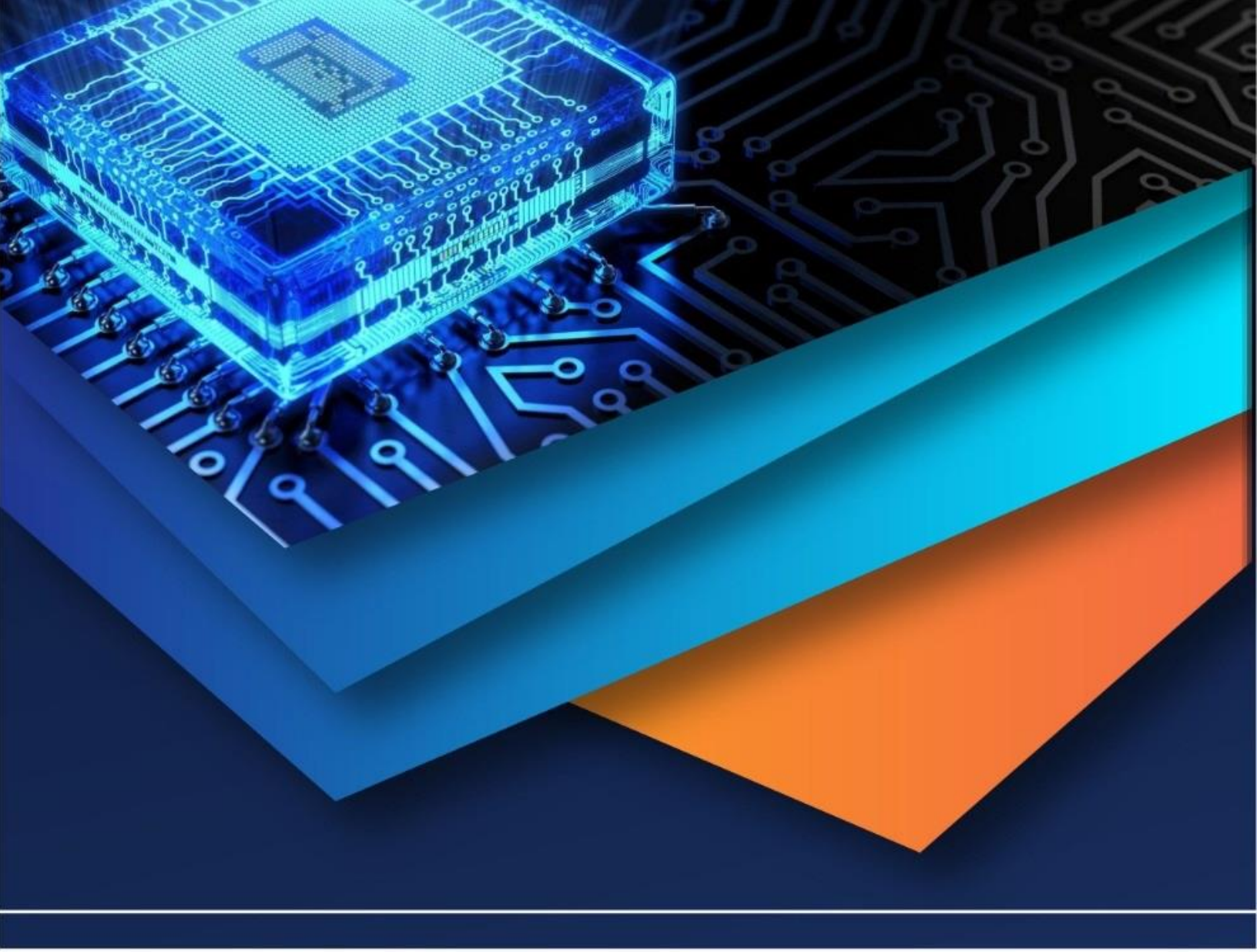

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