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Association of ABO Blood Groups with Incidence of renal Lithiasis

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Evidence continues to accumulate that there is a distinct relationship between ABO blood groups and certain diseases. The incidence of Group A has been shown to be unduly high in the subjects suffering from pernicious anaemia, carcinoma of stomach (Aird et. al., '53) and bronchopneumonia in infancy. Some of the investigators have done some work during the past few years (5 years) and concluded that persons belonging to the different ABO blood groups differ in their susceptibility to certain diseases of adult life. The first disease for which positive findings emerged on a scale, sufficient to carry fairly general conviction was cancer of the stomach (Aird et al., '53), but the clearest picture of a blood group association yet obtained, is that of group O with duodenal ulceration. It is seen that the frequency of group O is higher, usually markedly higher, in those suffering from duodenal ulcer than in the controls.

Unfortunately, as far as I am aware, no work has been done to find out an association of blood groups with renal lithiasis in any population so far. Hence the present attempt has been made to find out this type of association with different blood group systems such as ABO, MNSs, Rh, Duffy and Secretor factor.

Material and methods

The present survey was carried out in two well-equiped laboratories in civil hospitals. Both in-patients and out-patients were examined. The following items were recorded for each patient: (a) site of stone present, (b) method of diagnosis, (c) occurrence of previous acute complication, (d) ABO blood groups, (e) sex, (f) age, (i) the place of residence (187 patients suffering from renal lithiasis were also examined for Rh, Kell, Duffy and MNSs).

Most cases were diagnosed radiologically for the presence of stone in kidney or ureter (stone may be of phosphate or oxalate as has been found out by surgeons in few patients after operation). Before taking their blood sample for testing, X-ray reports were studied with the help of expert radiologists of the same hospitals.

For the present investigation freshly collected blood specimens were used. All the controls and patients sampled were grouped by the author using the standard

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slide technique for ABO blood groups and the tube technique for Rh, MNSs, Kell and Duffy systems.

A much more important objection was the possibility that hospital patients and donor controls might not be drawn from entirely corresponding populations. For this reason, second line controls were much desirable. These could be furnished by the patients from the same hospitals suffering from other miscellaneous diseases such as appendicitis, typhoid, malaria, eosinophilia, asthma, tuberculosis etc. To facilitate the comparison of the present study, the distribution of ABO blood groups in patients suffering from renal lithiasis in the hospitals was compared with the distribution of ABO blood groups in an equal number of patients chosen at random from the same hospitals.

Results

A more convenient way of expressing the results, however, is either to turn into the incidence of the disease in persons of one group relative to the incidence in another group or groups, or, the simplest and most straight-forward analysis, to examine the ratio A/(A+O) between renal lithiasis and control.

Tab. 1. Association of blood groups with incidence of renal lithiasis

No. in disease series	No. in control series	Percentage frequencies in disease and control series							
		Group O		Group A		Group B		Group AB	
		Disease	Control	Disease	Control	Disease	Control	Disease	Control
187	187	29.05 (54)	39.40 (74)	32.93 (61)	21.30 (40)	33.85 (63)	34.90 (65)	5.17 (9)	4.40 (8)

Gene frequencies	
Disease series	Control series
p = 0.247	p = 0.151
q = 0.254	q = 0.203
r = 0.539	r = 0.628
Total = 1.040	0.982

Absolute numbers are given in parenthesis

Against the general pattern of the ABO distribution in control samples, the frequency of blood group A is high and that of blood group O is low in the patients suffering from this particular disease. The percentage distribution of O is 29.05% in the patients of renal lithiasis and 39.40% in control sample whereas that of A is 32.93% in the patients and 21.30% in the control series. The percentage distribution of B (33.85, 34.90%) and AB(5.17, 4.40%) blood groups is almost equal in the patients and control respectively. The distribution of ABO blood groups of con-

trol sample has been compared with some of the North-Indian populations and found out that they are not statistically significant.

In Table 2 the percentage distribution of ABO blood groups in the patients has been compared with those of the corresponding controls and the relative incidence of

Tab. 2

Group	Renal lithiasis no.	Renal lithiasis %	Corresponding controls weighted %
O	54	28.88	39.40
A	61	33.69	21.30
B	63	32.62	34.90
AB	9	4.81	4.40
Total	187	100.00	100.00

Relative incidences of disease

In persons of group	Compared with persons of group	Relative incidence
A	O	1.91
A	B	1.59
A	AB	1.31
B	O	0.76
B	AB	0.82
O	AB	0.63

the disease in a particular group (i.e. A) has been calculated by the A/(AB+B+O) ratio.

The incidence of lithiasis in persons of group A is substantially raised as against its incidence in all the other ABO groups. Between themselves group B, O and AB show no significant difference. The incidence of renal lithiasis in the persons of group A against O, B and AB are 1.91, 1.59 and 1.31 respectively.

Table 3 repeats the result of Table 1. This time only O and A are shown, though it may be mentioned in passing that group B once again goes with the group in which

Tab. 3. Analysis of difference in relative proportions of blood group O and A in renal lithiasis and controls

1	2	3	4	5	6	7	8
Renal lithiasis		Control		(A+A/O)o%			χ^2
O	A	O	A	Renal lithiasis	Control	Difference	
54 (29.05%)	61 (32.63%)	74 (39.40%)	40 (21.30%)	53.04	35.08	17.960	17.4331

Probability for one degree of freedom = < .001

the incidence of the disease is low. The ratio of A/(A+O) % is 17.960 and the value of χ^2 is too high, i.e. 17.4331 for one degree of freedom. High value of χ^2 and the low probability (<.001) for one degree of freedom, might indicate the significant association of renal lithiasis with blood group A.

Discussion

It has been observed from the present study that renal lithiasis is more common in persons of blood group A than those of group O, B and AB. The frequencies in group B and AB are closely similar. When the association has been proved to exist, it is clearly of much interest to see whether differences are revealed on subdivision by sex, age and, more particularly, type, course and site of the disease. But it may not be possible to conclude any concrete result on the basis of present sample.

It is seen from the commonness of disease in all parts of India that this association with blood groups is not responsible for the geographic differences in the incidence of renal lithiasis. We must postulate that there are at least two influences operating in the cause of this disease in regard to the susceptibility with ABO blood groups: one is an inherited influence with relation to the A and O blood groups, and the other is presumably environmental.

Any explanation of the apparent susceptibility of renal lithiasis, with which blood group A is invested or protection against renal lithiasis which afforded by the possession of blood group O, is exceedingly difficult. It may be possible that the susceptibility of renal lithiasis, which the above mentioned figures in Tables 1,2 and 3 suggest, must be inherited, since blood groups A and O are inherited. Such a hypothesis, however, would be difficult to substantiate in the light of known facts of genetic theory as Aird et al. ('53) has suggested in determining the relationship between cancer of stomach and the ABO blood groups. The essential difference between patients and controls affects blood groups O and A in a reciprocal fashion, B and AB retaining equal level in both groups throughout the analysis of the present data.

Finally, after analysing the whole data, it can be said, that the high frequency of blood group A in the patients of renal lithiasis might indicate that this blood group may be more susceptible to this particular disease as blood group O is with duodenal ulcer. Due to the small sample collected, it is very difficult to analyse the present data according to their sex, age and site of the disease. Hence it is desirable to collect more data and find out the association according to the above mentioned groups (sex, and age particularly).

Other blood group tests for Rhesus factor, MNSs, Kell and Duffy have also been performed on the patients of renal lithiasis and on the control sample as well but no association of these blood group systems with the incidence of renal lithiasis has been found out, as the percentage distribution is almost the same in disease and control series (as shown in Table 4). Moreover, relative incidence (RI) is also below the unity which further confirms the negative association. Thus, these systems have not been discussed in the present article.

Tab. 5. Percentage distribution of MN, Rhesus and Duffy blood groups in the patients of renal lithiasis and controls (unselected sample)

Samples	No.	MN blood goups			Rhesus factor		Duffy blood groups	
		MM	MN	NN	Rh+	Rh—	Fy^a+	Fy^a—
(a) Patients of renal lithiasis	187	42.78 (80)	46.52 (87)	10.70 (20)	89.09 (167)	10.91 (20)	78.55 (147)	21.45 (40)
(b) Control (unselected sample)	187	41.17 (77)	48.12 (90)	10.70 (20)	88.77 (165)	11.23 (22)	80.22 (151)	19.78 (36)
		χ^2 = 0.1081			χ^2 = 0.1074		χ^2 = 0.2944	

Summary

187 patients suffering from renal lithiasis have been examined to find out an association with ABO blood groups. It has been found that the incidence of Renal Lithiasis is comparatively higher in the patients of blood group A than in those of blood group O. The difference in percentage ratios A/(A+O)% in patients and controls is 17.96; the χ^2 17.4331 for one degree of freedom shows that it differs from unity significantly. The frequencies of renal lithiasis in persons of blood group A against those of B, O and AB are 1.91, 1.59 and 1.31 respectively.

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RIASSUNTO

Sono stati esaminati 187 pazienti affetti da litiasi renale per trovare un'associazione con i gruppi sanguigni ABO. Si è trovato che l'incidenza della litiasi renale è relativamente più alta nei pazienti di gruppo A che in quelli di gruppo O. La differenza nei tassi percentuali A/A+O% nei pazienti e nei controlli è 17,96; il chi quadrato 17,4331 con un grado di libertà risulta differire significativamente dall'unità. La incidenza della litiasi renale nelle persone di gruppo A contro quelle di gruppo B, O e AB è rispettivamente di 1,91, 1,59 e 1,31.

RÉSUMÉ

On a examiné 187 patients atteints de lithiase rénale pour trouver une association avec les groupes sanguins ABO. On a trouvé que l'incidence de la lithiase rénale est relativement plus elevée dans les patients du groupe A χ que dans ceux du groupe O. La différence des taux pourcentuels A/A+O% chez les patients et chez les contrôles est de 17,96; le χ^2 17,4331 avec un degré de liberté résulte différer de l'unité significativement. L'incidence de la lithiase rénale chez les patients du groupe A contre ceux des groupe B, O et AB est, respectivement, de 1,91, 1,59 et 1,31.

ZUSAMMENFASSUNG

Es wurden 187 Nierensteinleidende untersucht, um eine Assoziation mit den ABO-Blutgruppen festzustellen. Man bemerkte, dass bei Patienten der Blutgruppe A Nierensteinleiden relativ häufiger vorkommen als bei denen der Gruppe O. Der Unterschied in den Prozentsätzen A/A+O% zwischen den Patienten und Kontrollpersonen beträgt 17,96. Das χ^2 17,4331 davons ist mit einem Spielraum von der Einheit recht entfernt. Das Vorkommen von Nierentseinleiden bei Personen der Blutgruppe A im Verhältnis zu Patienten der Blutgruppen B, O und AB beträgt 1,91, 1,59 bzw. 1,31.