

## THE RELATIONSHIP OF ZONOTIC CUTANEOUS LEISHMANIASIS TO ABO BLOOD GROUP

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### ABSTRACT

It has been hypothesized that leishmania parasites escape the host defence mechanisms by mimicry of human blood group antigen, conflicting reports have been published. The distribution of blood group types of human infected with cutaneous leishmaniasis was compared with control subjects. For each patient and control the following data were collected: age, sex, ethnic origin frequency of contamination with plant materials. In total number of infected persons 51.7% were males and 48.3% females. The highest rate of leishmaniasis were seen in the group of less than 10 years old and the least rate were in the age group of 40 to 55 year. We tested the hypothesis in cutaneous leishmaniasis, due to *Leishmania major*, by comparing to distribution of blood groups (ABO and Rhesus) among 482 patients in Isfahan central Iran with that among 1032 healthy controls. No association between blood groups and disease was found in this study, but further studies are needed with strains of the *Leishmania donovani infantum*.

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#### KEY WORDS

Cutaneous leishmaniasis; ABO blood group type; *Leishmania major*; Kashan-Iran

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### [I] INTRODUCTION

Leishmaniasis remains an important cause of morbidity and mortality in numerous areas throughout the world. The association of certain human blood groups with parasites is a controversial subject. In some cases positive relations have been demonstrated, as in schistosomiasis [1] and Giardiasis [2], while in other cases, such as filariasis [3], no evidence of association appeared to the investigators. In particular case of leishmaniasis the same discrepancy occurs: Walton and Valverde noted racial differences in the evolution of mucocutaneous leishmaniasis (MCL) due to *Leishmania braziliensis* [4]. Decker –Jacson and Honigberg [5] found that surface glycoproteins of *L. tropica* and *L. donovani* were comparable to certain ABO blood groups, suggesting a possible escape mechanism for these comparable to certain ABO blood groups of the patient [6]. On the contrary, a study of Brazilian patients with American visceral leishmaniasis (AVL) due to *L. donovani chagasi* did not show any significant relation between ABO blood groups and the development of the disease [7].

In order to determine whether there is an association between blood group types and zoonotic cutaneous leishmaniasis (ZCL) due to *L. major*, the distribution of blood groups in patients with this leishmaniasis observed in Isfahan Iran was compared with that in a control group of individuals living in province of Isfahan, with special attention being paid to ethnic origin and way of life.

### [II] MATERIALS AND METHODS

A descriptive study was performed by random cluster. The distribution of blood group types in two groups isolated of infected patients was compared with that in two groups of control subjects.

The first group of ZCL patients group (group1) was composed of worker individual of Afghan refugees. These individuals have relatively frequent contact with the plant materials and the kind of soil which can infect the human and vectors. The second group (group2), ZCL patients of Iranian origin, was composed of individuals contaminated referring to Central Health Care of Shohada in Isfahan. This group had very frequent contact with infected sandflies, and they made up the majority of the patients examined at the laboratory of center health care of Shohada Isfahan.

A first control group was composed of afghan origin healthy individual having the same criteria as the first group of patients live in the same located Isfahan area. In a similar way, we used a second control group with a composition similar to that of the corresponding patients group: healthy persons of Iranian origin.

Zoonotic cutaneous leishmaniasis is endemic in Isfahan located in central Iran [8-11]. For infected patients, the diagnosis of ZCL was parasitologically confirmed by examination of positive smears. In the majority of cases identification of the parasite was made by measurement of the amastigotes in the smear, by behavior of the parasites in culture and by isoenzyme characterization.

In the two groups of infected patients (Group 1 and 2) and in control group 3 and 4, peripheral blood was taken by vene puncture and placed on slide. Commercially available anti A, anti B, and Rh (Blood Research and Fractionation Co) was used to determine the blood type. For the subjects in Groups 3 and 4, ABO and Rhesus blood groups

were obtained from the records of blood bank of Isfahan. For each patient and control the following data were collected: age, sex, ethnic origin, frequency of contamination with plant material and the kind of soil which can infect the human and vectors, location of habitation.

All the data were put into a computer based analysis, using a commercial software package, and then chi-square test statistical comparisons were made to assess the association of blood group types with other parameters. The p-value less than 0.05 considered statistically significant.

### [III] RESULTS

In total number of 1514 infected persons, 51.7% were male and 48.3% female ( $p < 0.5$ ). The highest rate of leishmaniasis were seen in the age group of less than 10 years old (43.7%) and the least rate were in the age group of 40 to 55 (1.2%). The distribution of the active lesions in relation to the age is shown in **Figure-1**.

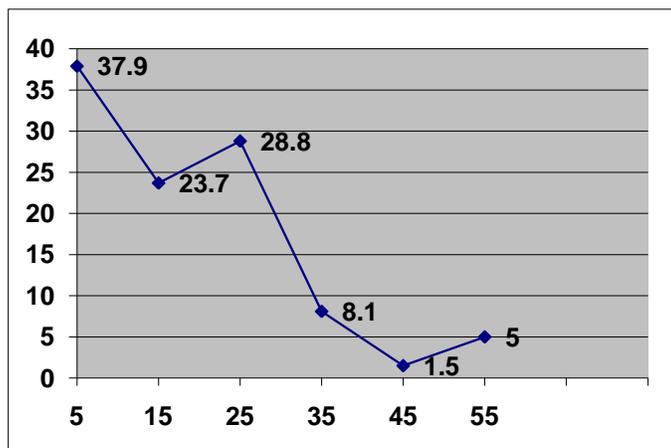


Fig: 1. Distribution of Zoonotic cutaneous leishmaniasis according to the age

Forty seven of the lesions were found on the hands, 21.4% on the face, 18% on the legs and 13.6% on other site of the body. From all infected patients, 1069 patients (70.6%) had only one lesion, 340 patients (22.4%), 2 lesions, 60 patients (4%), 3 lesions and 45 patients (3%) had 4 active lesions. According to these findings, 25.6% of the have living patients in north-eastern of Isfahan, 35.7% in west and 38.7% of them were referred from other clinics. 56% of patients were successfully treated.

The ABO and Rhesus blood group distributions are shown in **Supplementary Table-1** for patients with ZCL and the two groups. There was no significant difference ( $P < 0.5$ ) with chi-square between the distribution of ABO, Rh blood group types in patients (Group 1 and 2). Likewise, there was no difference in all patients (Group 1 and 2) during this period and all controls (group 3 and 4).

### [IV] DISCUSSION

The data show suggestive evidence there is not relation between blood group type and zoonotic cutaneous leishmaniasis. The findings thus fail to support the hypothesis of based on serotyping of leishmania excreted factors and studies of leishmanial surface glycoprotein's, that there is a relationship between ABO blood group and leishmaniasis in humans [6]. Our statistical evaluation was done with as many relevant comparisons as possible, and in no grouping could there be shown any association between ABO blood group type and ZCL.

In accordance with the comments of several authors of population – based studies we gave special attention in this study to statistical problems [7, 12, 13]. First, we were very careful with the selection of the different samples. One solution is the enter patients and control randomly cluster sampling in the study, as did [13], but we considered that the case / control method could be used with a minimum of precautions, particularly by selection control groups very similar to the patients group and seconds, we used sufficient numbers of controls and checked that the ratio of patients to control was not low.

The infections with *Leishmania* were evaluated by trained scientists in a laboratory, and not based on clinical features. The patients groups were homogeneously infected with *L. major*, which is the dominant subspecies in Isfahan–Iran. Where 117 of 1514 isolates obtained from human lesions were characterized as *L. major* by isoenzyme techniques [14]. The conclusion of our study is similar to that of [7] on AVL due to American cutaneous leishmaniasis (ACL) and [12] on ACL due to *L. braziliensis guyanensis*, which fails to support the hypothesis of camouflage by using blood group antigens. In their studies on AVL and ACL, these authors suggest that the susceptibility of humans of species other than *L. donovani infantum* may possibly be related to ABO blood type. Apparently this is not true for *L. major*, but further studies are needed with strains of the *L. tropica*.

Rather than a association between leishmaniasis in humans and the presence of red blood cell antigens other than ABO, we prefer to envisage the alternative hypothesis also suggested by

[7], that susceptibility to leishmaniasis, whether visceral or cutaneous leishmaniasis, might be related to surface antigens on human mononuclear phagocytes.

[V] CONCLUSION

Our results showed that the blood group was not a risk factor in the occurrence of ZCL. The ABO-Rh blood groups were not associated with the occurrence of ZCL in Iranian patients.

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This work was carried out with out any grant.

CONFLICTS OF INTEREST

All authors declare that we have no conflicts of interest.

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Supplementary Table (As supplied by authors)

Supplementary Table: 1. Distribution of blood groups in patients with Zoonotic Cutaneous Leishmaniasis and in controls from Isfahan-Iran. Comparison was made between the distribution of all patients with ZCL (Group 1 and 2) and all control groups (Group 3 and 4) and no significant difference was found.

Group	No	No (%) in blood group		No (%) Rh		In	A	O	B	AB
		+	-	+	-					
Infected group										
Group 1	42	14(33.3)	19(45.2)	7(16.7)	2(4.8)	38(90.5)	4(9.5)			
Group 2	75	29(38.7)	34(46.3)	11(14.7)	4(5.3)	69(92)	6(8)			
Control group										
Group 3	90	30(33.3)	42(46.7)	15(16.7)	3(3.3)	81(90)	9(10)			
Group 4	160	59(36.8)	70(43.7)	23(14.5)	8(5)	145(90.6)	15(9.4)			