

SERUM LEVEL MEASUREMENTS OF Gc, Cp, IgG, IgA, AND IgM IN PATIENTS WITH FAVISM, IN IRAN.

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Abstract

The quantitative measurements of Gc(P=37, C=20); Cp(P=40, C=20); IgG(P=67, C=50); IgA(P=67, C=50) and IgM (P=67, C=50) were carried out on patients with Favism and healthy individuals, both school boys, from the Caspian sea littorals.

Comparison of these groups revealed differences, significant for Gc ($X^2 = 10.177$), IgM ($X^2 = 9.6151$), IgA ($X^2 = 9.2821$), highly significant for IgG ($X^2 = 47.1228$), and not significant for Cp ($X^2 = 1.4762$).

The observed increase in the controls could be due to the environmental effects, e.g. the presence of different diseases which need adaptation to high levels of serum proteins and the immunoglobulins. The normal range maintained in the patients is suggested to be due to positive selection inducing a developed immune response and producing better chances not to get affected by some other endemic infectious diseases such as malaria (*P.falciparum*).

Introduction

Favism, a severe haemolytic anaemia due to G-6-PD deficiency and associated with consumption of fava beans(2,6), has been known to exist in Caspian sea littoral(north) and Persian gulf littoral (south) of Iran for the past approximately forty years. It is usually thought the diseases may be related to the genetic deficiency of red blood cell G- 6- PD(4).

In the Caspian area, commonly in Gilan and Mazandaran, however, favism is the common type of acute haemolytic anaemia prevalent mostly in children(7). It has been previously reported on the results of the pattern of bean consumption , laboratory findings in patients with favism, G-6-PD deficient and control group, in Iran(7).

In the present study, an attempt, was made to compare the levels of certain serum proteins and immunoglobulins(8) in patients with favism and the normal individuals(5).

Materials and Methods

The observations made in this study were based on 67 cases of patients with favism admitted to Pour Sina hospital, Rasht, in the Caspian littoral area of Iran, in the spring time. The normal individuals (n=50) and the patients were school boys attending rural primary schools in the same area.

The systems tested were: Gc (P=37,C=20); Cp (P=40,C=20) and IgG,IgA,IgM, each (P=67,C=50).The quantitation procedure was performed by radialimmunodiffusion techniques with standard M partigen plates provided by Behringwerke (3). Figure 1 is an example of the procedure for the case of IgG.

Results

Table 1 shows the results obtained for the serum factors considered in our study.

For the Cc level, there are five individuals in the control group with the range higher than the normal (25.00%)(3,10), whereas this is not the case for the patient group. Comparison between the two groups shows a significant result i.e. $X \text{ d.f.} = 10.1775$.

Results of the Cp system shows that no significant difference exists $X \text{ d.f.} = 1.4762$.

The level of IgG in the control group is shown to be higher than the normal range. Fig. 2 shows the serum level of IgG in the patients and control groups. Also comparison of the controls with the patients shows a highly significant result $X \text{ d.f.} = 47.1228$.

There is a significant difference in the case of IgM between the patients and the controls, $X \text{ d.f.} = 9.6151$.

Comparison of the patient and control groups for IgA shows a significant result, $X \text{ d.f.} = 9.1821$.

Table 2 shows the coefficients of correlation between various systems as follows:

There are positive correlations between Gc and Cp in the patients ($P=0.4314$) and the control group ($C=0.3138$).

For the cases of Gc and IgG, there are slight positive correlations in patients ($P=0.0401$) and the control group ($C=0.4236$).

Positive correlations exist between systems of Gc and IgM for the patients ($P=0.6406$) and control group ($C=0.3948$).

Comparison of Gc and IgA shows a high correlation in the case of patients ($P=0.8640$) and a slight one in the control group ($C=0.3876$).

Slight correlations exist between Cp and IgG in the patients ($P=0.0695$) and the control group ($C=0.2235$).

The outcome of the correlations between Cp and IgM are in case of the patients ($P=0.8577$) and the control group ($C=0.5115$), as exhibited in Fig.3.

For Cp and IgA the values of the correlations are :

Patients = 0.0993 and the control group = 0.3808 .

Demonstrated correlations between IgM and IgA are :

Patients = 0.3621 and the control group = 0.2650 .

Correlations between IgM and IgG systems are :

Patients = 0.3074 and the control group = 0.9121 .

Finally, correlations between IgG and IgM are :

Patients = 0.5489 and the Control group = 0.5133 .

Discussion

As shown in the Figs and Tabs., a highly significant difference exists between the patients and the control group in certain systems.

This could be explained by three assumptions:

a. The high values observed in the control group are much above the normal ranges. This could be due to environmental effects(1). It could be that the normal ranges in the healthy individuals in the Caspian littoral area are high. The reason could be that people living in this area are affected by different diseases which need adaptation to high levels of serum proteins and immunoglobulins. Thus the patients show normal values but always less than the control group.

b. It is reported that the Caspian littoral area is endemic for malaria(*P.falciparum*). Thus the people living in this area, who develop G-6-PD deficiency or thalassaemia are positively selected not to get affected by malaria.

c. In all the systems the control groups exhibit higher than normal values of serum level. On the other hand the patient groups show mostly normal values. This could be explained by suggesting that a positive selection(1,9) is maintained in patients with favism who have better chances not to get affected by some other locally common infectious diseases. Thus the patients do not have to develop the immune mechanism in the body. This is the reason why the normal serum levels of immunoglobulins do not exceed the normal ranges. Finally, it is reported that patients with favism are not affected by malaria because of general advantage. Thus, this could be the case in the present survey.

Table 1 - Numbers and percentages of individuals with various levels of serum factors

	G _e		C _p		IgG		IgM		IgA	
	Normal Range	Above Normal	Normal Range	Above Normal	Normal Range	Above Normal	Normal Range	Above Normal	Normal Range	Below Normal
Patients	37 100.00%	--	30 75.00%	10 25.00%	51 76.12%	16 23.88%	53 79.10%	14 20.90%	55 82.09%	12 17.91%
Controls	15 75.00%	5 25.00%	12 60.00%	8 40.00%	6 12.00%	44 88.00%	26 52.00%	24 48.00%	49 98.00%	1 2.00%
Total	52	5	42	18	57	60	79	38	104	13
	X ² =10.1775		X ² =1.4762		X ² = 47.1228		X ² =9.6151		X ² =9.2821	

Table 2- Coefficients of correlations between various systems:

	Gc	IgG	IgM	IgA
Cp P	0.4314	0.0692	0.8577	0.0993
C	0.3138	0.2235	0.5115	0.3808
Gc P	--	0.0401	0.6406	0.8640
C	--	0.4036	0.3948	0.3876
IgG P	--	--	0.8640	0.5365
C	--	--	0.2702	0.3798
IgM P	--	--	--	0.4519
C	--	--	--	0.9103

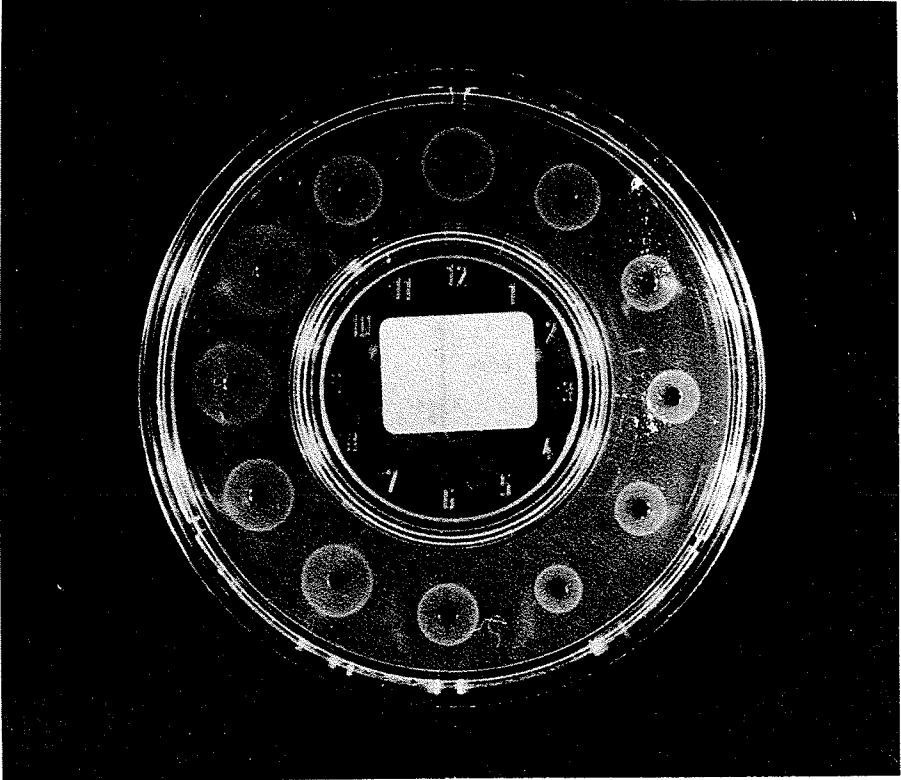


Fig.1- The outcome of radialimmunodiffusion technique for IgG, with Standard M Partigen plates.

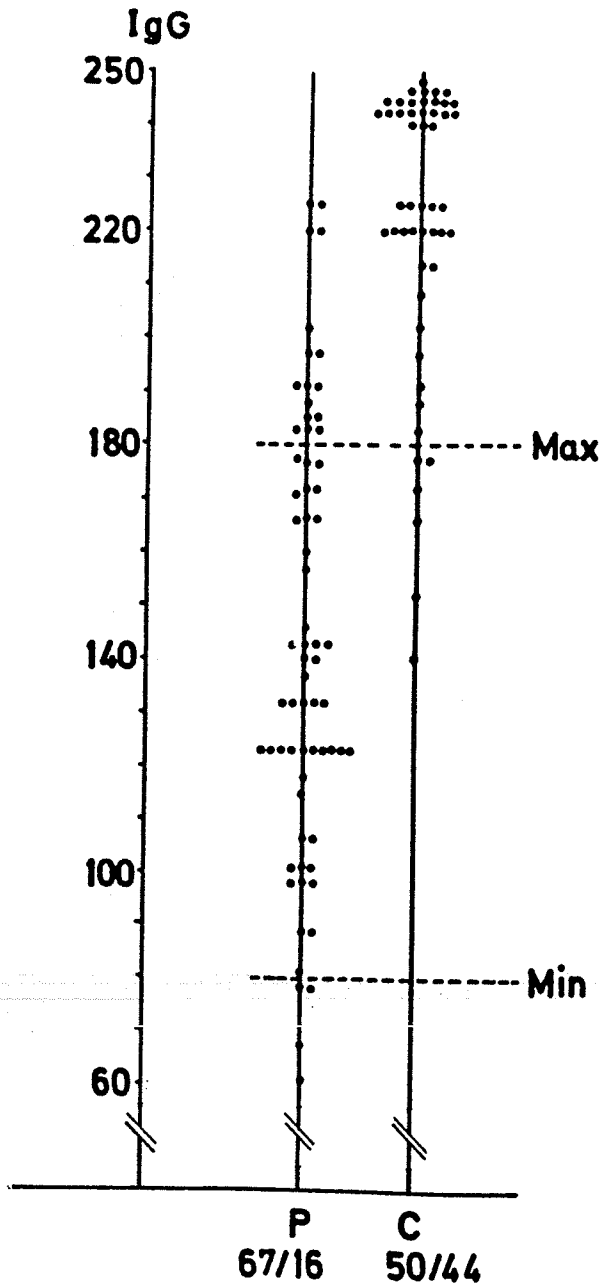


Fig.2- The serum levels of IgG (Iu/ml) in the patients and the control group

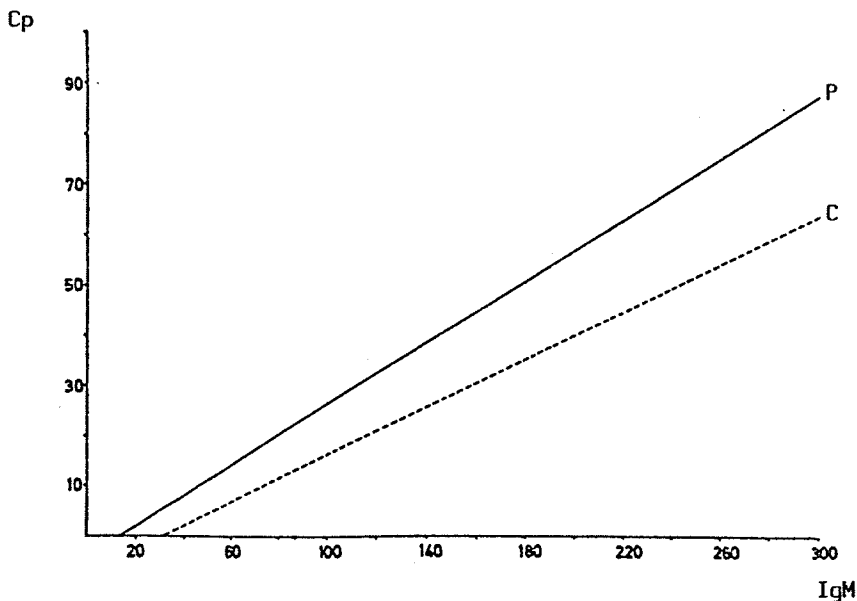


Fig.3- The correlation of Cp and IgM in patients and the control group

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