

HAPTOGLOBIN POLYMORPHISM IN THE MIDDLE EAST

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Summary The distribution of haptoglobin types in Iranians (n=627) is reported. Hp^1 gene frequencies, collected from published material, among Middle East populations are given. The interpretations of noted observations are discussed.

INTRODUCTION

Most human populations have been shown to be polymorphic for a number of blood groups, serum proteins and red cell enzymes. Smithies (1955) demonstrated that when human serum is subjected to electrophoresis, haptoglobin differentiates into three patterns which are found in most populations. Later, family studies carried out by Smithies and Walker (1956) suggested that these groups are controlled by two autosomal alleles, Hp^1 and Hp^2 , without dominance.

Data on geographic distribution of haptoglobin phenotypes in different populations of the world have been accumulated (Giblett, 1969; Kirk, 1968; Sutton *et al.*, 1959). Such studies have shown marked differences in the frequencies of Hp^1 and Hp^2 genes among European, African and Asian populations.

Knowledge on the distribution of polymorphic systems in the Middle East is rather limited and extensive data are only available regarding the ABO system. The present survey was carried out to enlarge our knowledge of the distribution of haptoglobin types in Iran and to contribute to the better understanding of genetic polymorphism in the Middle East.

MATERIALS AND METHODS

Blood samples, obtained from Iranians, were collected in 5 ml tubes. Serum was separated immediately and stored at -20°C until used. The persons sampled were healthy and unrelated. Horizontal starch gel electrophoresis was carried out

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Table 1. The distribution of haptoglobin types in Iranians.

Hp phenotype	Obs. No.	Exp. No.	Obs. Freq.	Exp. Freq.
1-1	49	49.40	0.0781	0.0788
2-1	254	253.19	0.4051	0.4038
2-2	324	324.40	0.5167	0.5174
0-0	—	—	—	—
Total	627	626.99	0.9999	1.0000

Gene frequencies: Hp^1 , 0.2807; Hp^2 , 0.7193.

Table 2. Distribution of Hp^1 gene frequencies in the Middle East.

Origin	No. tested	Hp^1 frequency	Authors
Turkish	274	0.25	Hummel <i>et al.</i> (1970)
Kuwaitis	158	0.345	Sawhney (1975)
Iraqis	118	0.288	Ramot <i>et al.</i> (1961)
Iraq (Jews)	118	0.29	Ramot <i>et al.</i> (1962)
Iraq (Jews)	197	0.270	Fried <i>et al.</i> (1963)
Arabs (S. Arabia)	92	0.445	Marengo-Rowe <i>et al.</i> (1974)
Israeli (Arabs)	75	0.36	Ramot <i>et al.</i> (1962)
Israelis (Orientals)	345	0.26	Goldschmidt <i>et al.</i> (1962)
Israeli (Kurds)	113	0.36	Ramot <i>et al.</i> (1962)
Kurdish Jews	96	0.300	Fried <i>et al.</i> (1963)
Israeli (Ashkenazim)	170	0.34	Ramot <i>et al.</i> (1962)
Israeli (Ashkenazim)	499	0.27	Goldschmidt <i>et al.</i> (1962)
Ashkenazi Jews	699	0.300	Fried <i>et al.</i> (1963)
Israel (Iran Jews)	158	0.310	Simhai (1976)
Yemen Jews	41	0.250	Fried <i>et al.</i> (1963)
Haban Jews	589	0.210	Bonné <i>et al.</i> (1970)
Towara Bedouin	198	0.429	Bonné <i>et al.</i> (1971)
Jebelliya Bedouin	95	0.789	Bonné <i>et al.</i> (1971)
Iranians	627	0.281	Present study
Iranians	360	0.270	Farhud & Walter (1972)
Iranians	34	0.25	Harris <i>et al.</i> (1959)
Iranians	97	0.354	Walter & Djahanschahi (1963)
Iranians	1,016	0.28	Miyashita & Ohkura (1975)
Iranians (Caspian Littoral)	448	0.214	Kirk <i>et al.</i> (1977)
Iranians	1,566	0.288	Bajatzadeh & Walter (1969)
Iranians	1,020	0.305	Bajatzadeh & Walter (1968)
Iranians	275	0.296	Sawhney (1975)
Iranian Moslems	429	0.28	Bowman (1964)
Iranian Zoroastrians	145	0.19	Bowman (1964)
Iranian Ghashquai	117	0.33	Bowman (1964)
Iranian Jews	91	0.30	Ramot <i>et al.</i> (1962)
Iranian Jews	101	0.290	Fried <i>et al.</i> (1963)
Iranian Jews	459	0.320	Tabatabai (1976)
Iranian Armenians	228	0.344	Tabatabai (1976)

using the discontinuous system of Poulik (1957) at pH 8.6. The haptoglobin patterns were typed by benzidine staining.

RESULTS

The distribution of Hp groups and respective gene frequencies were calculated by the gene counting method (Table 1). Close agreement was observed between the expected and phenotypic values, thus confirming the Hardy-Weinberg equilibrium. No Hp 2-1 (modified) or rarer phenotype was detected.

DISCUSSION

Data on the distribution of Hp^1 gene frequencies in various Middle East populations are set out in Table 2. Studies conducted on European populations show that Hp^1 gene frequency is remarkably similar throughout the continent, ranging from 0.36 to 0.43 (Kirk, 1968). In the Middle East, with few exceptions, the Hp^1 frequency is generally lower than that in Europe and usually lie between 0.25 to 0.36. The three major ethnic groups *i.e.* Iranians, Jews and Arabs in the Middle East, the differences found with regard to Hp^1 values, are insignificant (Ritter *et al.*, 1975). However, the highest Hp^1 values found in the Middle East are among the Jebelliya Bedouin (0.789), the Arabs of Southern Arabia (0.445) and the Towara Bedouin (0.429) (Bonné *et al.*, 1971; Marengo-Rowe *et al.*, 1974). By contrast the lowest values are observed among the Iranian Zoroastrians (0.19) and the Jews living in Haban (0.21) (Bonné *et al.*, 1970; Marengo-Rowe *et al.*, 1974). All other values exhibited by the populations shown in Table 2, are within the specified Middle East range. However, the Middle East populations on the whole exhibit lower Hp^1 values than those found in Europe and higher than those found in India where values range from 0.037 to 0.370 (Sunderland *et al.*, 1976). There appears to be a cline of increasing Hp^1 gene frequencies from Europe to India *via* the Middle East, the precise significance of which, in terms of environmental and genetic causation, cannot at present be gauged.

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