

Glucose-6-Phosphate Dehydrogenase Deficiency Among the Kumhars of District Churu, Rajasthan

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ABSTRACT The present paper outlines a study on the prevalence of G-6 PD deficiency in the above population. The data has been collected on 157 Kumhars – 101 males and 56 females, ranging in age from 7 to 68 years. The methaemoglobin reduction test and cyanamide methaemoglobin elution technique were used for the detection of G-6 PD deficiency. Results revealed an incidence of 4.9% deficiency in males, 1.7% in female homozygotes and 7.1% in heterozygotes.

INTRODUCTION

Sex-linked glucose-6 phosphate dehydrogenase deficiency is one of the most common enzymopathies variously estimated to be affecting from 100 million to over 200 million people worldwide; most are of African, Middle Eastern, Asian or Southeast Asian ancestry. (Beutler, 1991). More than 400 variants have been reported, differing in severity, clinical expression and biochemical properties (Beutler and Yoshida, 1988; Beutler, 1990). Its clinical importance stems from its association with neonatal jaundice, drug sensitivity, haemolytic anaemia during infections, favism and nonspherocytic congenital haemolytic anaemia (Beutler, 1990, 1991; Missiou-Tsagraki, 1992). G-6PD deficiency has become a model system for exploring the way(s) in which a genetically determined intra-erythrocytic factor and extracellular environmental factors interact in causing haemolysis.

The present study is an attempt to evaluate the prevalence of G-6PD deficiency and its association with malaria among the Kumhars of Churu, Rajasthan.

MATERIALS AND METHODS

The blood samples for the present study were collected from apparently healthy males (101) and females (56) in the age group of 7-68 years. The blood samples were collected in clean stop-

pered tubes containing saline solution. Blood was drawn by finger prick method using disposable sterile lancets. Relevant information regarding malarial attacks, if any, was also collected taking the help of local doctor, where available. Screening for G-6 PD deficiency was performed by using methaemoglobin reduction test (Brewer et al., 1962) and cyanamide – methaemoglobin elution technique (Gall et al., 1965). The latter technique was used to distinguish between heterozygote and homozygote females.

Churu district, a part of the Thar Desert, is one of the 26 districts of Rajasthan between 27° 24' to 28° 42' north latitudes and 74° 40' to 75° 41' east longitude. It is bounded by Ganganagar district in the north, by Sikar and Jhunjhunu districts of Rajasthan and Hisar district of Haryana in the east, by Nagaur district in the south and in the west by Bikaner district.

The main caste groups in the district comprise of the Brahmins, Rajputs, Jats, Kumhars, Meena, Naik and Dhanakas. The gradation in terms of social status and hierarchy of caste is – Brahmin, Jat, Kumhar, Khatri, Mali, Chamar, Meena, Dhanaka and Naik. The language commonly spoken is Rajasthani; Marwari and Kasi are also spoken.

Kumhars of Churu are an endogamous group and marry among their own caste albeit with in different sub-castes. Predominant clustering of marriages is found to be among Nanwal – Bodiwal (7), Kudal – Khandelwal (7), Kudal – Ghantewal (6) and Kudal – Jhilendra (6) indicating also their greater numerical strength.

RESULTS AND DISCUSSION

Table 1 shows the G-6 PD deficiency status among the Kumhars of Churu. Out of 101 males and 56 females tested, 4.9% males and 1.7% females were deficient and 7.1% were heterozygotes. The percentage frequency thus observed was

Table 1: Distribution of Glucose-6- Phosphate Dehydrogenase Deficiency among Kumhars of Churu, Rajasthan

Sex	No. Tested	G-6 PD Status			Percentage			χ^2 values	Combined gene frequency
		Normal	Partial Deficient	Deficient	Normal	Partial Deficient	Deficient		
Males	101	Observed			95.05	-	4.95	0.0182	G6PD = 0.9484
		96.00	-	5.00					
		Expected							
		95.79	-	5.21					
Females	56	Observed			91.07	7.14	1.79	0.143	G6PD* def = 0.0516
		51.00	4.00	1.0					
		Expected							
		50.37	5.481	0.149					

χ^2 significance seen at 5 per cent probability level with 1 degree of freedom

moderately low. The combined gene frequencies were found to be, $p = 0.9484$ and $q = 0.0516$. Female deficient and partially deficient were clubbed together as the number of partially deficient females was less than five. Only the females are relevant to the test of random mating. The χ^2 testing agreement between observed and expected numbers in females was 0.143 with 1 degree of freedom. This has a probability of $.80 > P > .70$ and can not be judged significant. The data are therefore compatible with the Hardy - Weinberg equilibrium.

Churu and its surrounding villages, from where the data was collected, were found to be prone to malarial attacks quite often. It was found that in village Buntia alone, one of the villages where the study was conducted, 25 persons out of the 500 tested had had malaria according to the health centre reports. Of the individuals interviewed, those who had suffered from malaria had had the attacks once or twice lasting from one day to one month. Chloroquine was the usual drug for treatment. Both *Plasmodium falciparum* and *P. vivax* were reportedly found in Churu, besides a mixed strain.

There are as yet a few studies available from Rajasthan on the prevalence of G-6 PD deficiency. G-6 PD deficient in Bhil males is 17% (Jain et al., 1981). A few other groups of tribes tested show incidence ranging from 13.5 to 20.00 per cent while scheduled caste groups have been reported to have the prevalence of G6PD*def from 3.3 to 15.9% (Jain et al., 1984; Choubisa, 1985). The frequency (%) of G-6 PD deficient in the Suthar community of Southern Rajasthan varies from 5.12 in Jangids (Suvalka Brahmins), 13.20 in Vishvakarmas to 15.49 in Mevalis

(Choubisa, 1987). The present study among the Kumhars of Churu, perhaps the first study on Prajapat community in North India, as far as G-6PD deficiency is concerned, it shows a moderate incidence of G-6 PD in comparison with other population groups of Rajasthan screened so far.

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