

Frequency of Glucose-6-Phosphate Dehydrogenase Deficiency (G-6-PD)  
among Infectious Disease and Control Patients at Children's Hospital

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**OBJECTIVE:** To determine the frequency of erythrocyte G-6-PD deficiency among patients hospitalized with various infectious diseases and outpatients free of serious disease, seen at Children's Hospital.

**BACKGROUND:** A high frequency of G-6-PD deficiency has been noted among Thai children with typhoid fever at Children's Hospital. Additional children hospitalized with infectious diseases including bacterial empyema, meningitis and osteomyelitis, tuberculous meningitis and typhoid fever were studied in addition to outpatient controls to determine the frequency of G-6-PD deficiency.

**PROGRESS:** Children with bacteriologically confirmed diagnoses of empyema, meningitis, osteomyelitis and typhoid fever had G-6-PD determinations performed by the methemoglobin elution technique of Gall (1).

Children with the clinical diagnosis of tuberculous meningitis and supportive skin test and cerebrospinal fluid chemistries were also studied as were 100 outpatient children judged by history and physical examination to be free of serious bacterial disease.

Table 1 presents the frequency of G-6-PD deficiency according to bacterial etiology and sex of the patients.

**DISCUSSION:** A high frequency of G-6-PD deficiency was noted in patients with typhoid fever (45%), pneumococcal empyema and meningitis (36%), and tuberculous meningitis (26%). A smaller number of patients with Staphylococcal or *Hemophilus influenzae* b infections had no apparent increased prevalence of G-6-PD deficiency (0-10%). The overall frequency of G-6-PD deficiency among outpatient controls was 11%.

The association of G-6-PD deficiency with typhoid and pneumococcal infections is analogous to the association of sickle cell anemia with *Salmonella* osteomyelitis and pneumococcal infections. An impaired reticuloendothelial system as a result of hemolysis has been suggested as a factor in the susceptibility of sickle cell patients to these infections. Defective bacteriocidal activity of the leukocytes from patients with erythrocyte G-6-PD deficiency has been noted when the G-6-PD activity of these leukocytes is absent or markedly depressed (less than 25%). An overburdened reticuloendothelial system as a result of hemolysis or defective bacteriocidal activity of leukocytes from G-6-PD deficiency patients are possible explanations for this association of erythrocyte G-6-PD deficiency and some bacterial infections.

REFERENCES:

1. Gall, J.C., Brewer, G.J. and Dern, R.J.: Studies of Glucose-6-Phosphate Dehydrogenase Activity of Individual Erythrocytes: The Methemoglobin-Elution Test for Identification of Females Heterozygous for G-6-PD Deficiency. *Amer. J. Hum. Gen.* 17:359, 1965.

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Table 1. Frequency of G-6-PD Deficiency by Bacterial Etiology and Sex

Study subjects	Sex	No. tested	G-6-PD deficiency		Frequency (%)
			Homozygous	Heterozygous	
Typhoid fever	M	19	7	0	37
	F	25	4	9	52
Pneumococcal infections	M	17	6	0	35
	F	8	0	3	37
Tuberculous infections	M	14	3	0	21
	F	9	1	2	33
Staphylococcal infections	M	4	0	0	0
	F	5	1	0	20
<i>H. influenza</i> b infections	M	6	0	0	0
	F	2	0	0	0
Outpatient control	M	55	8	0	15
	F	45	0	3	7