

THE FREQUENCY AND AGE PRESENTATION OF G6PD DEFICIENCY IN 200 PATIENTS OF HEMOLYTIC ANAEMIA

Mohammad Ishaq Khattak, Tehniyat Ishaq, Muhammad Subhan, Javed Afridi

Department of Medicine,
Khyber Teaching Hospital Peshawar

ABSTRACT

Objective: To determine the frequency of G6PD deficiency in the etiology of anaemia and jaundice and to determine the most common age of presentation with anaemia and jaundice due to G6PD deficiency in adults.

Material and Methods: We did a hospital based study in the department of Medicine Khyber Teaching Hospital Peshawar from June 2003 to December 2003. The data of adult patients with signs and symptoms of anaemia and jaundice was collected on structured proforma. The clinical presentation and laboratory investigation results were documented.

Results: Out of 200 patients studied, 24 (12%) patients were found to be deficient in G6PD enzyme. The male to female ratio was 21:3 (87.5% and 12.5%) respectively. The age of appearance of jaundice in adults varied (most common age from 13 to 17 years). The most common signs and symptoms were jaundice, anaemia and haemoglobinuria. All G6PD deficient patients except one recovered spontaneously when the offending precipitating factor were stopped or treated. One (0.5%) died because of rapid fall of haemoglobin and delayed recognition of the condition and subsequent blood transfusion.

Conclusion: G6PD deficiency is not an uncommon cause of jaundice and anaemia in our patients. The jaundice due to G6PD mainly affects the adults in 2nd or 3rd decade. Therefore all the children and adults with jaundice and anaemia should be screened for G6PD status.

Key Words: Glucose 6 Phosphate Dehydrogenase, G6PD deficiency, Drugs, Hyperbilirubinemia, Chronic Hemolytic Anaemia, Blood Transfusion.

INTRODUCTION

Glucose 6-phosphate dehydrogenase (G6PD) deficiency is the most common red blood cell (RBC) enzyme defect that causes hemolytic anemia¹. G6PD is present in over 400 million people world wide and is especially prevalent through out tropical and subtropical regions of the world². This X-linked hereditary deficiency was discovered more than 50 years ago as an outgrowth of studies of the unique sensitivity of some persons to the hemolytic action of certain drugs³.

Disease which involves this enzyme occurs more frequently in male than in females. About 13% of males African Americans have a mutant enzyme (G6PD^A) that results in a deficiency of RBC G6PD activity to 5-15% or less of normal. Italians, Greeks and other Mediterranean, Middle Eastern, African and Asian ethnic groups also have a higher incidence,

ranging from 5-40% of a variant designated G6PD^B (G6PD Mediterranean). In these variants, the G6PD activity of homozygous females or heterozygous males is less than 5% of the normal. A third common mutant enzyme with markedly reduced activity (G6PD canton) occurs in about 5% of the Chinese population⁴. In Pakistan G6PD^B (G6PD Mediterranean) variant accounts for more than 75% of G6PD deficiency⁵.

G6PD deficiency is one of the important causes of indirect hyperbilirubinemia and chronic hemolytic anaemia and high bilirubin level some times need exchange transfusions⁶. Jaundice due to G6PD deficiency occurs in the neonates with no exposure to an offending agent, while later on there is often exposure to drugs, naphthalene, aniline dyes or vitamin K analogues⁷. In Pakistan it is also one of the common etiologic factors for hyperbilirubinemia and anaemia. However there is limited data on frequency of G6PD deficiency in

FREQUENCY OF G6PD DEFICIENCY IN 200 PATIENTS WITH HEMOLYTIC ANAEMIA



Figure -1

Pakistani jaundiced patients⁸. This study has been carried out to determine the frequency of G6PD deficiency in adult patients presenting with jaundice and anaemia, because in Pakistan it is the second most common cause of hemolytic anemia (after thalassemia⁹).

MATERIAL AND METHODS

This study was carried out in the department of Medicine, Khyber Teaching Hospital Peshawar from June 2003 to December 2003. Total 200 patients with anaemia and jaundice were admitted to the Medical 'A' Ward of Khyber Teaching Hospital, Peshawar for a full work up for G6PD deficiency. Patient's siblings who were found to have G6PD deficiency on screening but neither anaemic nor jaundiced were excluded from this study. Complete history, detailed examination and investigations of the patients were recorded on prepared proforma including sex, age, address and other associated symptoms etc. All the patients underwent the following investigations i.e. total serum bilirubin level, direct and indirect bilirubin, complete blood count, reticulocyte count, and G6PD enzyme estimation in the same laboratory using "sigma diagnostic G6PD reagent" for the semi quantitative visual and calorimetric determination of G6PD deficiency in red cells procedure of the test. The patient was diagnosed as G6PD deficient when the test result was more than 60 minutes.

The data was processed using statistical package for social sciences. The following statistics were applied, frequency distribution (%age), mean, median, standard deviation and range.

RESULTS

The total number of patients was 200. These patients with jaundice and anaemia fulfilling the criteria were analyzed for different parameters such as age, sex address and G6PD status.

Out of these 200 anaemic patients admitted to Medical "A" ward of Khyber Teaching Hospital, Peshawar, Twenty four were found to be

DIFFERENT CAUSES OF JAUNDICE AND HEMOLYTIC ANAEMIA

Cause of jaundice and anaemia	Number	%age
G6PD deficiency	24	12
ABO incompatibility	35	17.5
Rh incompatibility	15	7.5
Spherocytosis/elliptocytosis	1	0.5
Undetermined	125	62.5
Total	200	100

Table 1

G6PD deficient, so the frequency of G6PD in anaemic patients was 12% (Fig-1). G6PD deficiency among male and female patients was 7% and 1% respectively. The most common age of appearance of jaundice and anaemia in G6PD deficient cases was 13 to 17 years. The patients included in this study belonged to different parts of NWFP and refugees from Afghanistan, but majority of these were from Peshawar as shown in 'figure 2'. Other common causes of hyperbilirubinaemia and anaemia like ABO incompatibility, Rh incompatibility, spherocytosis etc were also found during this study as shown in table 1.

Out of the 24 G6PD deficient cases 6 (25%) were having history of jaundice and hemolytic anaemia in other siblings, 5(20.8%) cases had history of G6PD deficiency in other close family members. 16 patients (66.7%) were having mild jaundice while 8 (33.3%) were having moderate jaundice.

DISCUSSION

Anaemia with jaundice is one of the common causes of admission to paediatric and medical units all over the world. There are many causes of jaundice with anaemia in children and adults including G6PD deficiency, ABO incompatibility, Rh incompatibility, breast milk jaundice, sepsis, hereditary spherocytosis and undetermined causes⁴. G6PD enzyme plays an important role in the pentose pathway of glucose metabolism. G6PD helps in production of NADPH which serves as cofactor for glutathione reductase in generating reduced glutathione which detoxify hydrogen peroxide. G6PD deficiency results in the instability of reduced Glutathione in red blood cells leading to haemolysis. G6PD deficiency is the second most common cause of hyperbilirubinaemia and hemolytic anaemia in our country⁹. The children who are G6PD deficient may present in the later life with chronic hemolytic anemia or acute hemolytic crises if they are exposed to certain oxidant drugs or chemicals¹. To prevent all these complications, G6PD status of

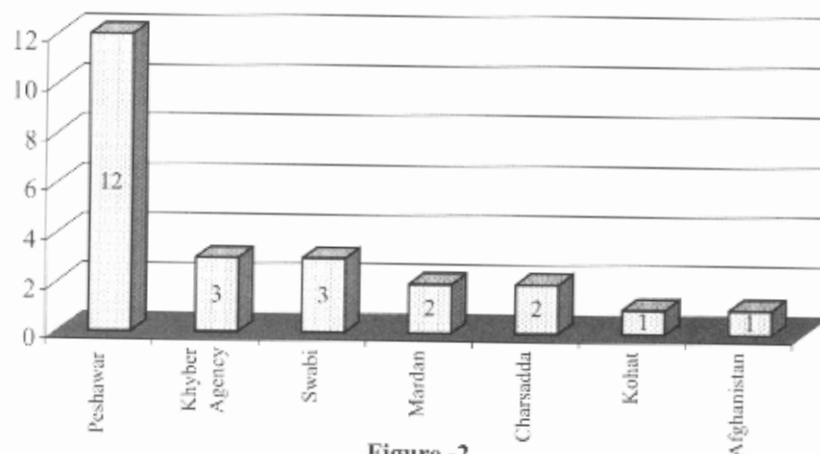


Figure -2

the persons must be known¹⁰. The presence of concomitant hemolytic disorders like ABO and Rh incompatibility and other risk factors for jaundice may lead to the development of kernicterus¹¹.

In this study of 200 patients with jaundice and anaemia the frequency of G6PD deficiency was 12%. This figure is quite higher than the studies reported by Khan M¹² who reproduced a figure of 3.4% and Ali et al¹³ who mentioned a frequency of 3.17%. These variations may be due to demographic difference (frequency varies from 1.5% to 51% in different parts of the globe¹⁴), difference in the genetic makeup of societies, socio cultural differences, frequency of carrier individuals, sample size, method used for G6PD enzyme estimation and detection rate. In present study of 200 patients with jaundice and anaemia at the time of admission to the hospital the age ranged from 13 to 17 years, while the commonest age of appearance of jaundice in neonates ranged from 2-3 days and in adults from 13-23 years. Almost similar results were obtained by other workers like Imran M et al 1984¹⁵ and Khan M¹².

Males were affected more than females. Twenty one (87.5%) of the G6PD deficient adults were males while only 3(12.5%) were females with over all male to female ratio of 7:1. This ratio is almost equal to the ratio mentioned in the different national and international studies. Majority of the patients belonged to district Peshawar as shown in figure 2.

Antimalarials (primaquine etc), antibiotics (sulphonamides, dapsone, chloromphenical, ciprofloxacin etc) and analgesics (aspirin, phenacetin etc) are the most common precipitating factors for haemolysis. Anemia, fever and jaundice are the most common presentations while malaria the most common associated disease¹⁷.

G6PD deficiency is a common cause of anemia with drugs as common precipitating factor for haemolysis. Such complications can be avoided

with early recognition of the disease and avoiding indiscriminate use of drugs.

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Address for Correspondence:

Dr. Mohammad Ishaq Khattak
Assistant Professor
Department of Medicine,
Khyber Teaching Hospital, Peshawar.