

Original Research Article

Study on estimation of glucose-6-phosphate dehydrogenase in patients prior to initiation of dapsone therapy in leprosy

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ABSTRACT

Background: Administration of dapsone in glucose-6-phosphate dehydrogenase (G6PD) deficient patients can lead to hemolysis which may be severe enough to warrant discontinuation of the drug. Screening for G6PD deficiency in leprosy patients before initiating treatment can prevent such adverse events.

Methods: Medical records of all leprosy patients presenting between 1st January 2018 to 30th June 2018 were reviewed. G6PD levels, if done, were recorded for all patients needing dapsone therapy.

Results: Of the 62 patients requiring treatment with dapsone (43 outpatients and 19 inpatients), G6PD estimation was done in 43 cases, i.e., 60.46% (26/43) of outpatients and 89.4% (17/19) of inpatients. 10 patients were found deficient (6/26 outpatients and 4/17 inpatients).

Conclusions: G6PD levels were not uniformly estimated in all patients requiring dapsone therapy. It was done more commonly estimated in inpatients (89.4%) when compared to outpatients (60.46%). The deficient G6PD levels were seen in 16% cases.

Keywords: Dapsone, G6PD, Leprosy, India

INTRODUCTION

Dapsone is a 4, 4'-diamino-diphenyl sulfone is often used in the treatment of various dermatological conditions. The mechanism of action of dapsone in leprosy is by the inhibition of folic acid pathway.¹ It is part of the WHO multidrug therapy in leprosy and is instituted at 100 mg/day. The most common dermatological indication requiring dapsone therapy is Hansen's disease. The drug is inexpensive and commonly the dose used is 100mg/day. However, dapsone is known to cause both pharmacologic and idiosyncratic adverse events. The occurrence of hemolytic anemia and methemoglobinemia is a dose related side effect which is seen in almost all patients who take dapsone.² This adverse event during

leprosy treatment seems to be more frequent than reported. Individuals deficient in erythrocytic glucose-6-phosphate dehydrogenase (G6PD) are at risk of severe and potentially fatal hemolysis due to dapsone. G6PD is a principal enzyme in the hexose monophosphate shunt. It is a direct oxidative pathway that prevents conversion of haemoglobin to methaemoglobin.³ The deficiency of this enzyme is an X-linked condition and sometimes could lead to hemolytic anaemia. Males are hemizygous for the gene and could either be normal or deficient. In females the enzyme could either be normal (homozygous), deficient (double heterozygous) or intermediate (heterozygote).⁴ Dapsone being an oxidant can precipitate haemolysis. Hemolytic anemia during therapy may warrant discontinuation of dapsone. It is prudent to

monitor dapsone therapy with periodic estimation of complete blood counts and liver function tests. The aim of this study was to determine if estimation of G6PD levels was being done in dermatology patients (outpatients and inpatients) prior to initiation of dapsone therapy in Hansen’s disease.

METHODS

This retrospective study was carried out at Chandulal Chandrakar Memorial Medical College, Durg, Chattisgarh during the period 1st January 2018 to 30th June 2018. The study subjects were patients with Hansen’s disease who were on treatment with dapsone. The study was approved by the institutional review board and ethical committee.

All leprosy patients (outpatients and inpatients) either currently on dapsone therapy or those planned for dapsone therapy during the period 1st January 2018 to 30th June 2018 were included in the study. A retrospective review of records was done. Patient characteristics like age, sex and the level of G6PD, if done, was recorded in a data collection proforma. G6PD levels were measured using UV spectrophotometry assay. It has a measuring range of 0-6.5 G6PD/g hemoglobin. Levels >6.5 G6PDH/g hemoglobin is considered desirable whereas levels <2.1 G6PD/g hemoglobin is considered deficient. The values lying in between connote partial G6PD deficiency.

Quantitative variables were expressed as mean±standard deviation or in median with range. Qualitative variables were expressed as numbers with percentage. All data was entered using MS excel and the same was used for statistical analysis.

RESULTS

In the study period, 62 patients who required treatment with dapsone for Hansen’s disease were identified. Of these 43 were outpatients and 19 were inpatients. There were predominantly male patients in the study period and accounted for 93.5% (58/62). The median age group of outpatients was 34±13.8 years and for inpatients 32±12.4 years respectively (Figure 1).

The levels of G6PD were estimated in 60.46% (26/43) of outpatients and 89.4% (17/19) of inpatients, which was remarkably higher (Figure 2).

The level of G6PD was deficient in four inpatients as compared to six outpatients. Two of the patients with low G6PD values were not initiated on treatment. In the other two dapsone was introduced under close observation and both of them developed hemolysis after approximately 3 months. Among the outpatients, one patient with low G6PD also had hypersensitivity syndrome to dapsone. Four patients were started on dapsone of which two developed hemolysis, one had stable hemoglobin

throughout and one did not pursue further treatment. In one anticipating hemolysis due to very low G6PD values, dapsone was not prescribed.

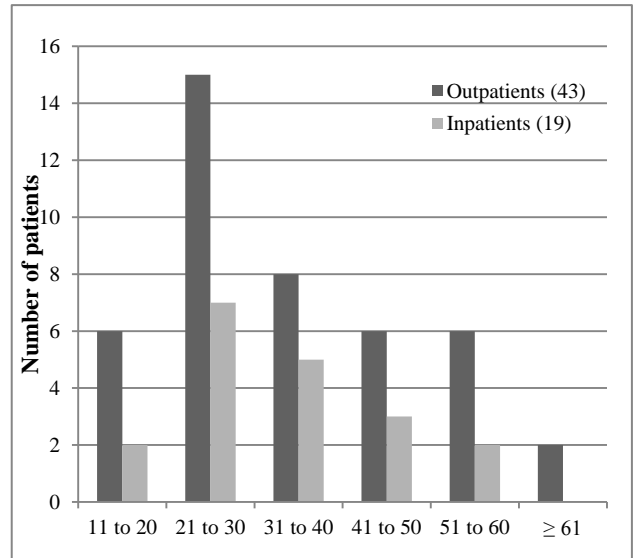


Figure 1: Patient distribution as per age groups.

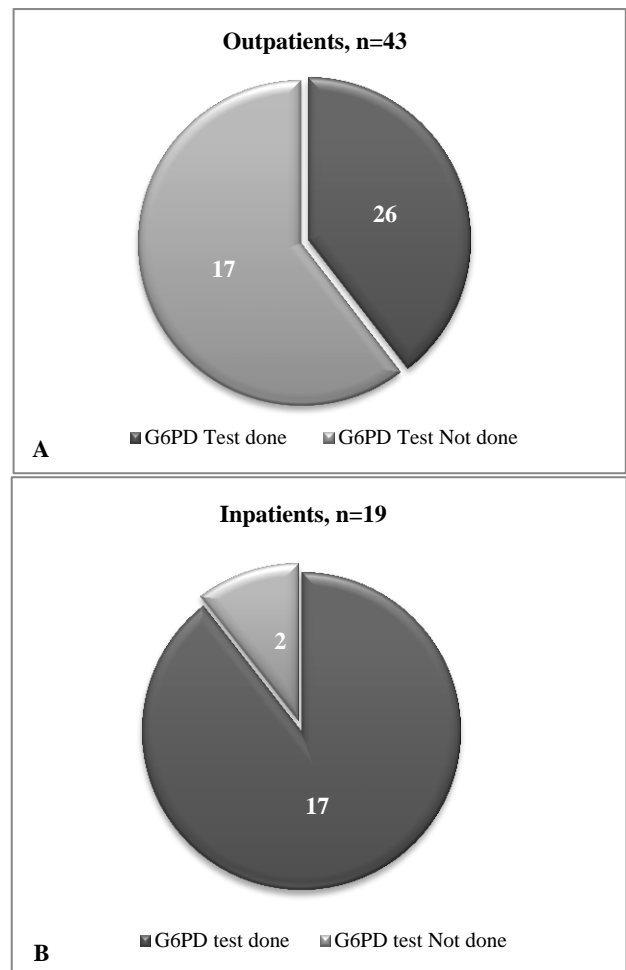


Figure 2 (A and B): Distribution of G6PD estimation done among outpatients and inpatients.

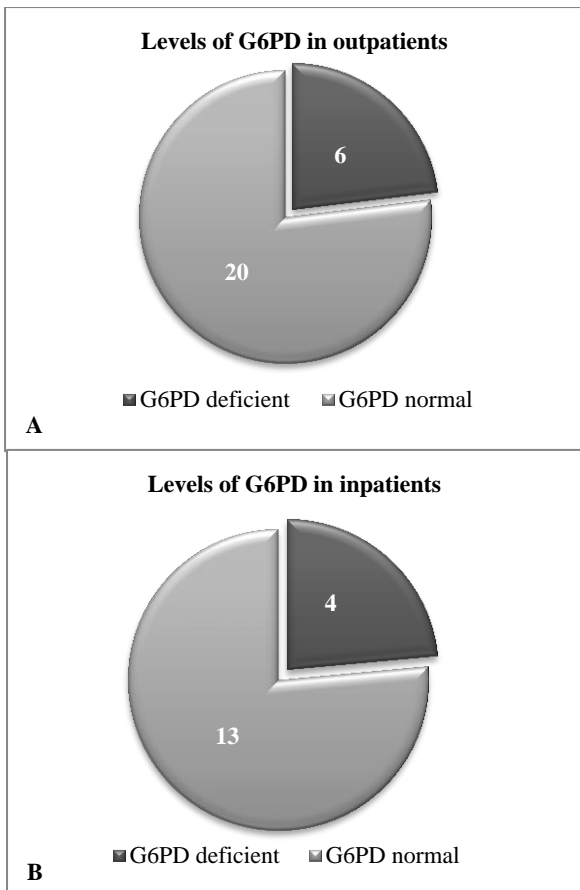


Figure 3 (A and B): Distribution of G6PD deficiency among outpatients and inpatients.

DISCUSSION

G6PD plays a crucial role in preventing oxidative damage to proteins and to other molecules in all cells, especially RBCs. G6PD-deficient red cells are highly vulnerable to oxidative damage.

G6PD deficiency is one of the most common inherited hemolytic disorders reported. Majority of persons with inherited G6PD deficiency have no symptoms. Anemia and hemolysis develop only as a result of challenge by exogenous agents. Certain anti-malarials like primaquine, dapsons, quinolones, some non-steroidal anti-inflammatory agents, fava beans, certain chemicals are the commonly implicated drugs precipitating haemolytic anaemia in G6PD deficient individuals.

In the present study, G6PD deficiency was found in 16% of the cases. Prevalence of G6PD deficiency across the country varies from 0 to 28% in different caste, tribe and ethnic groups.⁵ A great variation has been observed among the different populations of India. The highest prevalence is reported from South India and Western India.⁵ In this study, G6PD deficiency was prevalent in 16% cases. Although this study has determined the prevalence in only leprosy patients needing dapsons

therapy and not the general population, the impact of the findings is immense, keeping in view the fact that this population is at high risk of development of hemolytic complications subsequent to administration of dapsons. Of the six G6PD deficient subjects who were started on dapsons, four developed hemolysis.

Another study on leprosy patients from Maharashtra found G6PD deficiency in 25.7% cases (26 out of 101).⁶ They also commented that leprosy might be commoner in G6PD deficient cases, as a previous study had found that the prevalence of G6PD deficiency in the general population of the same area was just 9.6%.⁷ However, they also found that there were no significant differences in incidences of the deficiency in different types of leprosy, thus concluding that the G6PD deficiency did not have an effect on the development of different types of leprosy.

To conclude, it is imperative that G6PD levels be estimated in each patient requiring dapsons therapy to prevent any adverse incidences.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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