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INCIDENCE OF G6PD DEFICIENCY AMONG HEALTHY SUDANESE BLOOD DONORS IN KHARTOUM STATE

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ABSTRACT
Background: Glucose-6-phosphatebdehydogenase is an enzyme that protects RBCs from oxidative damage by free radicals in food, drugs, chemicals or infectious conditions. If blood from donors with G6PD deficiency is transfused to patients, it can cause serous case for the patient lead to hemolytic anemia and other complication. **Objectives:** This study was aimed to detection of Glucose-6-Phosphate dehydrogenase deficiency in appear healthy blood donors and detection of Glucose-6-Phosphate dehydrogenase deficiency in blood donors among age.**Materials and methods:** A handered EDTA blood samples obtained from blood donors were subjected to screen of G6PD deficiency using spectrophotometer. **Results:** Out of 40 blood donors, the G6PD status of donors; 8 of them (20%) were found to be deficient in activity, while 32 donors (80%) were found normal. Out of 8 deficient, 4(16.7%) of them in age group 19-32y and 4 belonged to age group 33- 46y had G6PD deficiency. There were no significant differences in G6PD enzyme status in study population when compared to age with p.value=0.399. **Conclusion:** This study was found the prevalence of G6PD deficiency present in 20% of blood donors.

KEYWORDS: G6PD deficiency, spectrophotometer, Blood donors.

INTRODUCTION
G6PD is a cytoplasmic enzyme. It has a housekeeping role in all cells, and is particularly critical to the integrity and functioning of RBCs. The major function of G6PD is the prevention of oxidative damage to cells by promoting detoxification of free radicals.[1] The G6PD gene is present on the long arm of the X chromosome (Xq28) and consists of 13 exons with a length of 18 kb. The active form of G6PD enzyme is either a dimer or a tetramer of a single polypeptide subunit of about 59 kD12. Association of these subunits was NADP dependent.[2][3]

This enzyme deficiency is very prevalent in individuals of Africa, America, Mediterranean, and East Asia. In India the incidence of G6PD has been variably reported as 0–37% in different castes and communities. Higher incidence of G6PD deficiency is seen in north and west India (15%) as compared to south India (1– 2%).[4] Severe manifestations of G6PD deficiency can be prevented if necessary precautions are taken, hence this study was done to determine the incidence of G6PD deficiency in asymptomatic population represented by healthy blood donors and to characterize the demographic profile and laboratory profile of such group. Early detection and prevention is the key strategy to successful management and control of G6PD deficiency. Genetic counseling, prenatal diagnosis, health education, and public awareness can provide benefits by way of preventive genetics to the affected individuals and their families.[5]

Glucose-6-phosphate dehydrogenase deficiency is very common worldwide, and causes acute hemolytic anemia in the presence of a simple infection, ingestion of fava beans or reaction with certain medicines, antibiotcs, and antimalarials.[6]

MATERIALS AND METHODS
Study Design and Population
This study designed as cross sectional study among 100 donors person come to blood bank department as volunteer, their age range between 19-46 years old. The study was conducted from March 2018 to September 2018.

Study area
This study was conducted in National public health labrotary.

Data processing
All data was entered and analyzed using statistical analysis soft were SPSS (statistical package for social sciences) version 21. P-value less than 0.05 were

considered as statistically significant.

Ethical considerations

This study was ethically revised by the faculty of medical laboratory sciences, Al- Neelin University. The purpose of this study was clarified and discussed with the donors and their relatives, the permission and support was requested, and verbal consent was obtained before beginning the data collection.

Data collection

Blood donors were interview using a direct interviewing questionnaire. Medical information was collected from the donors. The questionnaire was used to collect data regarding name, age, gender.

Sample collection

A total of 3 ml EDTA anti-coagulated venous blood samples were collected from blood donors. Gentle mixing of the anti-coagulated specimens was achieved to avoid hemolysis, clotting or platelet aggregation.

METHODOLOGY

The method used in this study was spectrophotometer

Principle of spectrophotometer: The enzyme activity is determined by measurement of the rate of absorbance change at 340nm due to the reduction of $NADP^+$.

Reagent: G6PD reagent

Procedure: Adjust the instrument to zero with distilled water then Pipette into test tube 100ul of R1(Triethanolamine PH7.6), 30ul of R2(NADP), and 15ul of haemolysate and mix, incubate at 37c for 5minutes. Then add 15ul of R3 (Glucose.6.Phosphate), mix, read initial absorbance and start timer simultaneously, read after 1, 2 and 3 minutes.

RESULTS

Forty blood donors were studied (aged 19–46 years); 24 of the donors were aged 19–32 years and 16 were 33–46 years. Most common age group was 19-32 years.

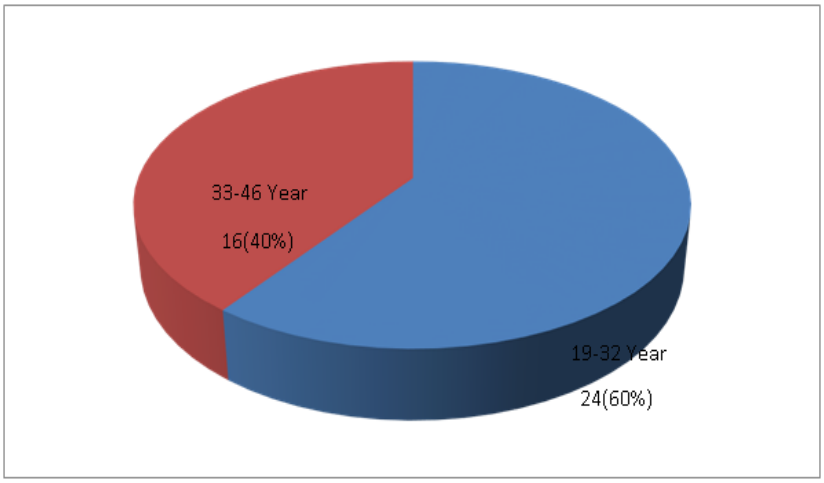

Figure 1: Frequency of age.

Out of total number of 40 blood donors, the G6PD status of participants; 8 of them (20%) were found to be deficient in activity, while 32 donors (80%) were found normal.

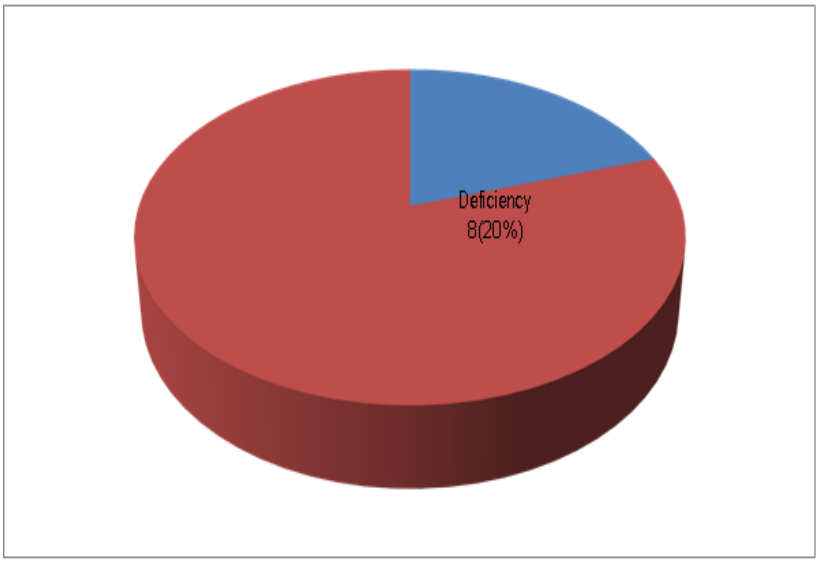

Figure 2: Frequency of G6PD (Deficient or normal) in blood donors.

Out of total 24 blood donors in age group 19-32y, 4(16.7%) of them had G6PD deficiency and 4(25%) of 8 blood donors belonged to age group 33-46y had G6PD deficiency. There were no significant differences in G6PD enzyme status in study participants when compared to age with p.value=0.399

Table: G6PD (Deficient or normal) in correlate to age group.

Age	G6PD		Total
	Deficiency	Normal	
19-32 Year	4 (16.7%)	20 (83.3%)	24 (100.0%)
33-46 Year	4 (25.0%)	12 (75.0%)	16 (100.0%)
Total	8 (20.0%)	32 (80.0%)	40 (100.0%)
P-value	0.399		

DISCUSSION

Forty blood samples were studied from blood donors came to blood bank for donation and screened for G6PD test. Donors within the 19–32 years age group had the highest representation in this study (60%); this pattern of donor distribution is in agreement with the report of Bolarinwa. in South West Nigeria, and represents the most active age stratum of the population.[7] In another study done by Aneke etal, one hundred blood donors were studied (aged 18–60 years); 39% of the donors were aged 18–25 years, 36% were 26–35 years, 11% were in the 36–45 years, while 14% were aged 46 years and above.[8]

In this study, the prevalence of total G6PD deficiency was 20% among our blood donor population; this is keeping with reports from parts of Nigeria. In North Central Nigeria, Egesie *et al*. showed that 20% (26 out of 130) of blood donors had deficient G6PD enzyme activity, while in Osogbo, South West Nigeria, Akanni *et al*. reported the prevalence rate of 19.5%.[9][10]

Also agrees with study done by Pankaj Kumar *etal*, Out of total 133 blood donors who had G6PD deficiency, maximum 75(56.4%) blood donors belonged to age group 21-30. Most common age group was 21-30 years where total 1137 blood donors were found.[11]

In another study done by (Shanthala Devi 2010) was conducted on 2005 healthy blood donor samples who came to blood bank for donation of blood. Sixteen blood donors out of 2005 screened by methaemoglobin reduction test were found to be G6PD deficient. All of them were male. The incidence of G6PD deficiency was 0.8% in the sampled population.[12]

CONCLUSION

The observation of 20% prevalence of G6PD deficient blood donors in the present study could be taken to consider that the problem of G6PD deficiency exists in the blood donors. Prevalence of 20% should be taken as serious concern and further studies are advised for screening of G6PD in blood donors.

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