Public Awareness of Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency Causes and Prevalence Factors

Muath Salman Almuhaini * • Mohammed Khalid Alruzayhi • Akrm Ibrahem Alwassel
Osama Mansour Alateeq

College of Medicine, Al-Imam Mohammed bin Saud Islamic University, Riyadh, Kingdom of Saudi Arabia
Akrm.Alwasel@hotmail.com

Abstract: Glucose 6-phosphate dehydrogenase (G6PD) deficiency is an x-linked disorder that consequently causes the hemolysis of Red Blood Cells (RBCs) if exposed or triggered by certain factors. The current study aims to measure the awareness and knowledge level of the Saudi community in Riyadh city. A random sample of 86 participants was asked to fill a pre-designed questionnaire examining the awareness and knowledge level about G6PD deficiency. Results of the study had shown that the Saudi community had a poor knowledge level about G6PD deficiency, especially in the pattern of inheritance, symptoms, and factors triggering this disorder. The study had recommended that there is an urgent need to carry out awareness campaigns to increase the Saudi community awareness level regarding G6PD deficiency.

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1. Introduction:

Glucose 6-phosphate dehydrogenase (G6PD) is an enzyme which helps red blood cells (RBCs) function normally. G6PD deficiency is a hereditary condition in which the individual has low levels of the G6PD enzyme, and causes that the RBCs get destroyed quickly when exposed to a certain trigger such as medications, food, or disease (Cappellini & Fiorelli, 2008).

The Glucose 6-phosphate dehydrogenase (G6PD) deficiency had been considered as the commonest enzymatic inherited disorder of RBCs, which affects more than 500 million people worldwide (Luzzatto *et al.*, 2016). The disease has been reported in people from nearly all geographical locations; however, it occurs most frequently in areas where *Plasmodium falciparum* malaria had been endemic (Shannon *et al.*,2015). G6PD deficiency was discovered for the first time when hemolytic anemia occurred in some persons who consumed anti-malaria drug named Primaquine.

The G6PD gene is located on the long arm of the X-Chromosome (Xq28). Most deficient people do not show any symptoms until or following exposure to oxidative drugs, some infections, and ingestion of Fava beans.

The mutation in the G6PD gene may lead to the production of a G6PD enzyme that has diminished functionality and/or stability, which demonstrating different levels of enzyme activity and consequently wide range of biochemical and clinical presentations principally neonatal jaundice and acute hemolytic anemia triggered by an exogenous agent in most cases (Guindo *et al.*, 2007).

More than 176 mutations and 500 different variants have been described to date for the G6PD gene, however, most are single base changes, leading to amino acid substitution (Sarbeen & Sethu, 2015).

The current study aims to assess the public awareness level of G6PD deficiency causes and prevalence among the Saudi community.

2. Methodology:

A cross-sectional descriptive study had been carried out by administering a pre-designed questionnaire form on a randomly selected sample from the Saudi community.

The study population was represented by Saudi males and females attending three governmental hospitals in Riyadh city, which are Al-Yamama hospital, Armed forces hospital, and King Salman hospital.

The study sample was composed of 86 participants who were selected randomly from the study population.
A pre-designed questionnaire composed of two parts; the demographic data part and the questionnaire items part, had been administered to the study participants.

Data analysis had been performed by calculating the frequencies, percentages, means, and standard deviations of the participant's responses. The study was performed under the institutional research and ethics committee.

3. Results:

3.1. Study sample distribution according to their demographic characteristics

Results shown in Table 1 indicate that the participants ranging in age between 30 to 40 years were the highest represented category (45.3%), followed by participants older than 40 years (29.1%).

Distributing the study participants based on their gender had revealed that 59.3% of the participants were males while 40.7% were females.

Results of the study participants distribution according to their educational level had indicated that participants holding an undergraduate degree (Diploma or Bachelor) had represented 50% of the total study sample, followed by those participants having a postgraduate degree (Master or Ph.D.) who constituted 33.7% of the total sample count.

Table 1: *Study sample distribution according to their demographic data.*

Characteristic		Frequency (N)	Percentage (%)
Age	Less than 20	5	5.8%
	20 - less than 30	17	19.8%
	30 – 40	39	45.3%
	More than 40	25	29.1%
Gender	Male	51	59.3%
	Female	35	40.7%
Education	Illiterate	4	4.7%
	Secondary stage	10	11.7%
	Undergraduate	43	50%
	Postgraduate	29	33.7%

Results shown in Table 2 represent the mean and standard deviation scores for the study participants" responses to the questionnaire items. Findings had shown that the first item stating that " G6PD is a hemolytic disease) was the highest estimated item (1.81±0.71) followed by the fifth item " Fava beans can trigger an attack of G6PD" (1.71±0.53), while the third rank was the tenth item stating that " G6PD deficient individuals do not appear to acquire any illness more frequently than other people" that got (1.57±0.48)

On the other hand, the lowest three items were the sixth item stating that " Pallor is one of the symptoms of G6PD" that got (1.21±1.01), followed by the ninth item " A side effect of G6PD deficiency is that it confers protection against malaria" that got (1.13±0.57). the least ranked item was the eighth item stating that " Splenectomy could be beneficial for some G6PD deficiency patients" that got (1.01±0.39)

The total knowledge and awareness scale score was 1.412±0.567, which points to a poor knowledge level and low awareness among the study participants regarding G6PD deficiency.

Table 2: *Means and standard deviation score for knowledge and awareness questionnaire items.*

Item	Mean	Standard deviation
G6PD is a hemolytic disease	1.81	0.71
Both parents have to be carriers for G6PD to have an affected child	1.32	0.49
G6PD is a blood disease	1.44	0.62
Inheritance of G6PD is related to gender	1.39	0.63
Fava beans can trigger an attack of G6PD	1.71	0.53
Pallor is one of the symptoms of G6PD deficiency	1.21	1.01
Certain drugs could be a factor causing RBCs break down in G6PD deficiency	1.53	0.77
Splenectomy could be beneficial for some G6PD deficiency patients	1.01	0.39
A side effect of G6PD deficiency is that it confers protection against malaria	1.13	0.57
G6PD-deficient individuals do not appear to acquire any illness more frequently than other people	1.57	0.48
Total score	**1.412**	**0.567**

4. Discussion:

Glucose 6-phosphate dehydrogenase (G6PD) deficiency is an X-linked disorder and considered as the most common enzymatic disorder of RBCs in human affecting millions of people worldwide. Exposure to specific medications or Fava beans in people with this disorder may exhibit nonimmune hemolytic anemia.

Findings of the study had shown that the respondents had poor awareness and knowledge of G6PD deficiency. Results had shown that the participants' poor knowledge was represented by their poor knowledge in that G6PD deficiency is a blood disorder and its pattern of inheritance and transmission through generations.

Moreover, participants did not show knowledge about Pallor as one of the symptoms of G6PD deficiency and that a side effect of G6PD deficiency is that it confers protection against malaria. The least knowledge level was represented by the poor knowledge that splenectomy could be beneficial for some G6PD deficiency patients.

Findings of the current study are inconsistent with Al Hajeri and Al Arrayed, (2011) study results which indicated that Bahraini people have a good knowledge level about G6PD deficiency (Al Hajeri & Al Arrayed, 2011).

Furthermore, the current study results are inconsistent with Al-Joborae (2015) study results which had shown that there is a fairly good level of awareness of G6PD deficiency in Iraqi society despite the widespread confusion regarding certain aspects (Al-Joborae, 2015).

5. Conclusion

This study concludes that there is a poor knowledge level among the Saudi community regarding G6PD deficiency, and a clear misunderstanding about the pattern of inheritance, symptoms, and factors triggering the disorder.

Based on the previously presented findings, the study recommends that intensive awareness campaigns should be carried out targeting different categories of the Saudi community regarding G6PD deficiency disorder.

Furthermore, policymakers should be encouraged to support the health care services providers and motivate them to hold workshops, courses, and educational seminars that could significantly increase the community awareness level about G6PD deficiency.

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Conflicts of Interest:

There are no conflicts of interest among authors.

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Corresponding Author:
Akrm Alwassel, MD.
College of Medicine, Al-Imam Mohammed bin Saud Islamic University, Riyadh, Kingdom of Saudi Arabia.
E-mail: Akrm.Alwasel@hotmail.com

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