

Public Awareness of Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency

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Objective: To evaluate public awareness level of G6PD deficiency in Bahrain.

Design: Cross sectional survey.

Setting: Bahrain Schools, Public Gathering Centers (commercial malls and others).

Method: A questionnaire was distributed among 2000 individuals from the public (non-probability convenience sample). It was conducted from December 2006 to February 2007. The participants were personally interviewed by a health professional or a trained interviewer.

Result: One thousand eight hundred fifty-nine (93.9%) has heard of G6PD deficiency and 1,586 (79.8%) recognized it as a blood disease, only 690 (34.7%) recognized it as a gender related disease. One thousand seven hundred three (85.7%) knew that fava bean ingestion can be a triggering factor for hemolysis in affected individuals. Females showed better knowledge than males and married persons seem to know more about G6PD deficiency than unmarried.

Conclusion: The study revealed a good level of knowledge of G6PD deficiency. Some of the respondents were confused about the pattern of inheritance. Females are more knowledgeable of the disease, which affects mainly males, and married individuals seem to know more than singles. There is a general acceptance of hemoglobinopathies prevention campaigns, which is conducted in Bahrain, such as the premarital service and the student-screening program.

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Glucose-6-Phosphate Dehydrogenase (G6PD) deficiency is the most common enzyme defect in man. At least 400 million people are affected worldwide¹. This enzyme is involved in the pentose phosphate pathway, and is essential for the survival of red blood cells. People affected with the disease might develop hemolytic anemia upon exposure to certain stresses, such as, infection, certain medications or chemicals. Hemolysis upon ingestion of fava beans has been linked to the disease. However, not all individuals with G6PD develop clinical manifestations on ingestion of fava beans.

The disease is X-linked recessive affecting males predominantly. However, because of the high prevalence, affected females are frequently encountered.

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The incidence varies from one nation to another, the highest incidence is among Kurdish Jews (70% among males)¹. In Bahrain, a screening study showed high prevalence of G6PD deficiency among male blood donors, up to 26.4%². Just like the other common hemoglobinopathies, such as, SCD and beta thalassemia, G6PD deficiency has been linked geographically with global distribution of malaria.

In general, the incidence of genetic blood diseases in Bahrain is considered high³. In 1984, the first genetic clinic was established, which has started several educational campaigns. In 1991, the Bahrain Hereditary Anemia Society was formed. In 1992, the Minister of Health formed a national committee for the prevention of genetic diseases in Bahrain. Screening of all pregnant women began, followed by newborn testing if the mother was found to be a carrier³. In 1993, a premarital counseling (PMC) service was organized and expanded to include all health centers⁴. In 2004, Bahrain Government has passed a law of free mandatory premarital counseling⁵. In 1998, student-screening project has began⁶. Newborn screening program for blood diseases has been launched in 2007⁷.

The aim of this study is to evaluate the public awareness level of G6PD deficiency in Bahrain.

METHOD

A questionnaire about SCD, beta thalassemia and G6PD reduced activity was distributed. The first part of the questionnaire was personal information: age, sex, job, level of education and social status. In this study, we are presenting the G6PD deficiency part only. The questionnaire was randomly distributed to 2000 individuals from the public, which include school teachers, secondary school students and others (non-probability convenience sample). It was conducted from December 2006 to February 2007. The participants were interviewed face to face either by a health professional or a trained interviewer. The study was approved by Genetic Department, SMC. The obtained data was coded and processed by using SPSS (15.0).

RESULT

The response rate was 100%, females were 1,106 (55.3%) and 894 (44.7%) were males. The age range of 689 (34.8%) respondents fall in the age group of 10 to 19 years only 15 (0.8%) were above the age of 30, see table 1.

Table 1: Age Distribution

Age	Number	Percent
10-19	689	34.8
20-29	627	31.7
30-39	376	19.0
40-49	213	10.8
50-59	61	3.1
>50	15	0.8
Total	1,981	100

The age was not recorded in 19 individuals

Five hundred eighty-three (36.3%) of the respondents were professionals, 406 (25.3%) were students and 618 (38.5%) were unemployed. The respondents to this item were 1607. The interviewee level of education ranged between illiterate to postgraduate. Nine hundred sixty-six (48.8%) were school students, 900 (45.5%) university graduates and 92 (4.6%) postgraduates, while 22 (1.1%) respondents were illiterate. The respondents to this item were 1980. One thousand fifty (53%) were single and 932 (47%) were married. The respondents to this item were 1982.

The questionnaire part of G6PD deficiency was composed of 12 multiple-choice questions. The first question was “have you ever heard of G6PD deficiency?”. A majority of 1859 (97.6%) answered ‘yes’, compared to 45 (2.4%) who have not heard of it. The respondents to this item were 1904. G6PD deficiency was recognized as a blood disease by 1586 (79.8%), 271 (13.6%) answered ‘do not know’ and 131 (6.6%) believed it is not, see table 2. The respondents to this item were 1988.

Eight hundred ninety-three (44.9%) thought that both parents have to be carriers for G6PD to have an affected child, 771 (38.7%) correctly answered ‘no’ and 326 (16.4%) ‘did not know’. The respondents to this item were 1990. Whether the disease is related to the gender, 690 (34.7%) correctly stated ‘yes’, 804 (40.4%) answered ‘no’ and 497 (25%) ‘did not know’. The respondents to this item were 1991.

More than half of the respondents 1,159 (58.3%) knew that they have G6PD deficiency, 597 (30%) did not have it and 228 (11.5%) did not know. The respondents to this item were 1987. The majority, 1703 (86%) recognized fava beans as a triggering factor, 80 (4%) answered ‘no’ and 204 (10.3%) ‘did not know’. The respondents to this item were 1980. Eight hundred and thirty-five (43%) knew that some medications might trigger an attack, 383 (19.7%) answered ‘no’ and 722 (37.2%) ‘did not know’, see table 2. The respondents to this item were 1940.

Table 2: General Knowledge of G6PD

	Yes	No	Don't know	Total *
Have you ever heard of G6PD deficiency?	1,859 (93.9)	45 (2.3)	76 (3.8)	1,980
True or false: G6PD is a Blood disease	1,586 (79.8)	131 (6.6)	271 (13.6)	1,988
Is it true that both parents have to be carriers for G6PD to have an affected child?	893 (44.9)	771 (38.7)	326 (16.4)	1,990
Is the inheritance of G6PD related to the baby's gender?	690 (34.7)	804 (40.4)	497 (25)	1,991
Do you know whether you personally have G6PD?	1159 (58.4)	597 (30.1)	228 (11.5)	1984
Can Fava beans trigger an attack of G6PD?	1,703 (85.7)	80 (4)	204 (10.3)	1987
Can some medications trigger an attack of G6PD?	835 (43.1)	383 (19.7)	722 (37.2)	1940
Is pallor one of the symptoms of G6PD attack?	1364 (68.8)	184 (9.3)	434 (21.9)	1982
Are nausea, vomiting, anorexia and diarrhea symptoms of G6PD attack?	1049 (53.2)	318 (16.1)	606 (30.7)	1973
Is giddiness one of the symptoms of G6PD attack?	1,238 (62.5)	240 (12.1)	504 (25.4)	1982
Is jaundice one of the symptoms of G6PD attack?	899 (45.5)	386 (19.5)	691 (35)	1976
Is shortness of breath one of the symptoms of G6PD attack?	644 (32.6)	523 (26.5)	809 (40.9)	1976

*The totals of each item does not add to 2000 because of missing data

Those who had previously heard of SCD correctly answered 9 questions out of the 12 questions related to G6PD deficiency, ($P<0.05$). When we tested the relationship between the level of knowledge and gender, the responses were significantly different for 8 questions ($P<0.05$). Despite the fact that G6PD deficiency is commoner among males, females showed better knowledge of G6PD deficiency, especially the nature of the disease, the mode of inheritance and the common symptoms.

University graduates gave more accurate answers than the rest of respondents ($P<0.05$). When we tested the relationship between the respondents' occupation and their level of awareness, the results were insignificant. Seven of the 12 questions (58%) were answered correctly by married individuals, which was significantly better than the knowledge of single individuals ($P<0.05$).

DISCUSSION

The respondents had fair basic knowledge of G6PD deficiency. The majority has heard of G6PD deficiency and recognized it as blood disease. However, their knowledge about the pattern of inheritance seems to be lacking. The result is similar to the knowledge of SCD⁸. Adewuyi also had similar findings in respect to the mode of inheritance of SCD⁹.

More than half of the respondents stated that they have the disease, which is dissimilar to previous studies in Bahrain^{2,6,7,10}.

The respondents showed fair knowledge of the symptoms of G6PD deficiency hemolytic attack compared to the good knowledge of SCD symptoms⁸. This can be attributed to the relatively mild clinical nature of G6PD deficiency in Bahrain.

Similar to the finding from the SCD study, we found that undergraduate college students were more aware of hereditary blood disease compared to postgraduates ($P<0.05$)⁸. However, Adewuyi, found that undergraduates in Nigeria had markedly deficient knowledge of SCD compared to the results of our study where the undergraduates in our study had a good knowledge of SCD as well as G6PD deficiency^{8,9}. Lane et al, also found that the knowledge of SCD was closely related to educational level¹¹. No specific studies evaluating the knowledge of G6PD deficiency were found to compare our result with.

Our study has some limitations such as the sampling method, where some might argue against. In this type of sampling, a potential bias might be unknowable and the relationship between the target population and the survey sample might be immeasurable. Nevertheless, our justification is the large number of our sample.

CONCLUSION

We found a good level of awareness of G6PD deficiency in our study. Some of the respondents were confused about the pattern of inheritance. Females are more knowledgeable of this disease, which mainly affects males, and married individuals know more about the disease than singles.

Further studies to test patients' awareness and attitude toward their illness are recommended.

We strongly recommend that student-screening program, premarital counseling and newborn screening service to be continued.

We also recommend that essential information about common blood diseases, including G6PD deficiency to be included in school curriculums.

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