

Adult Favism in Al-Ramadi City

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Abstract

Objectives: to examine the methods used to diagnose favism at Al-Rammadi Pediatric Hospital in adult patients who have a history of the condition.

Patients and method: The investigation was conducted from January 1 to December 31, 2021. The group was then divided into two. Throughout the course of the trial, group 1 participants were all patients who were admitted to a pediatric hospital and diagnosed with favism. Any patients with a protracted history of favism who were met in routine medical practice throughout the trial period and gave his consent were also added to group 2 if they chose to participate.

Results: A total of 41 patients were present; group 1 consisted of 20 men and 5 women, whereas group 2 consisted of 16 patients (13 men and 3 women). Group 1's diagnosis of favism was primarily clinical in the absence of sufficient test evidence. Of them, 11 had relatives who had suffered from favism, and four of them had alarmingly lengthy histories of the illness. One patient in group 2 had a potentially dangerous past history of favism, six had a family history of the disease, ten had a G6PD test completed, and seven of them had the disease confirmed. The ingestion of fava beans was resumed in the 14 patients who were left for a variety of reasons after Favism. Every instance in both groups occurred between the end of February to the end of April.

Keywords: Favism, G6PD deficiency, acute hemolytic and fava bean.

INTRODUCTION

The bean and the red cell are the two main characters in favism. Favism defies the traditional division between intraerythrocytic and extraerythrocytic causes of severe hemolytic anemia since it only manifests in individuals with G6PD-deficient red cells when they are exposed to specific compounds found in fava beans. This condition has long been recognized. Fava beans were grown in ancient Egypt and Greece and are referenced multiple times in the Iliad of Homer (8th to 9th century BC). It is known that fava beans are poisonous in some way, which limits their usage as food for a very long time (1,2). The incidence of G6PD deficiency in Iraq was 8.9% in adults and 8.4% in babies as of (2), and it was around 6% overall as of (1, 3), although it is uncertain how prevalent Favism is in the country. G6PD insufficiency affects many people, however it is most common in populations of Africa, Southern Europe, the Middle East, Southeast Asia, and Oceania (3).

Different signs with a wide range of severity make up the clinical presentation of G6PD deficiency. Depending on how severe an enzyme deficit is, the World Health Organization has categorized G6PD insufficiency into classes I through IV. Patients in class II have a significant enzyme deficit with G6PD activity that is less than 10% of normal. When exposed to items that cause oxidative stress, such as fava beans (as in this example) or oxidizing drugs, Class II patients frequently develop occasional hemolytic episodes. As an example, Mediterranean-type G6PD deficit, a class II deficiency, can be characterized as a G6PD deficiency based on mutations in the G6PD gene that are present in particular ethnic groups (4,5).

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Access this article online

Quick Response Code:



Website:
www.pnrjournal.com

DOI:
10.47750/pnr.2022.13.04.158

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How to cite this article: A S Mahdi, S H Tahseen, Endoscopic Findings in Patient with Dyspepsia in Al- Ramadi General Hospital, J PHARM NEGATIVE RESULTS 2022;13: 1136-1140.

Due to the X-linked recessive nature of G6PD deficiency, hemizygous males exhibit the majority of the clinical symptoms, while the majority of female carriers do not have any symptoms (1,3). The most typical signs are newborn jaundice and severe hemolytic anemia, which typically show up 2-4 days after exposure to a trigger, such as specific drugs, toxins, or infection-causing substances (7,8). When fava beans are consumed, people with G6PD deficiencies have a condition known as favism, which is an acute hemolytic crisis (6). When a patient has a G6PD deficit, this is the most typical cause of acute hemolytic anemia. Favism occurs in isolated cases throughout the remainder of the year and in outbreaks in the spring and throughout FB harvest (9). While G6PD serves as a housekeeping enzyme in all cells, the amount varies depending on the kind of tissue (10). The amount of nicotinamide adenine dinucleotide phosphate is maintained by this enzyme, which is the rate-limiting enzyme in the pentose phosphate pathway (NADPH). Glutathione can continue to be decreased inside of cells thanks to NADPH. Reduced glutathione guards against oxidative harm to cells. The pentose phosphate pathway is the only source of reducing power for red blood cells because they lack mitochondria (11). There is a significant amount of reductive potential because G6PD only works at 1% to 2% of its capability in red blood cells (12). However, when the reduced glutathione storage is exhausted, hemoglobin is more susceptible to oxidative damage and can experience hemolysis.

Patients and method

From January 1 to December 31, 2021, the study was carried out. It was then separated into two groups. All patients who were admitted to a pediatric hospital and given a favism diagnosis throughout the study's time frame were included in the group 1 participants. If he agreed to participate, any patients with a long history of favism who were encountered in routine medical practice during the study period were also included in group 2. All patients' histories were obtained from them or from their family members, and when accessible, their hospital records and investigations were reviewed. Fava bean consumption before and after the assault, recurrence of the attack, and confirmation of G6PD deficiency by any test were all given special consideration. For follow-up, all patients' mobile devices were collected. Fluorescent spot tests are used as a screening test for G6PD (14)

Identifying G6PD Deficiency

G6PD deficiency can be determined using a fluorescence screening test or a quantitative spectrophotometric analysis to measure the enzyme's activity. Alternately, DNA sequencing can be utilized to find the actual gene mutation (13). Based on determining the rate at which NADP is converted to NADPH, tests are used to assess G6PD activity. The tests rely on particular NADPH properties (14).

1. Light absorption at 340 nm.
2. Fluoresces when exposed to long wavelength UV radiation (approximately 340 nm).
3. Causes the decolorization or precipitation of certain dyes.

Fluorescent spot tests and dye decolorization methods can be used as point-of-care tests to screen for G6PD deficiency since they are simple to perform and produce findings rapidly (13).

The following criteria have recently been proposed by the British Society for Haematology (14) for screening: • Prior to starting any treatment that can harm red blood cells through oxidative stress.

- A long-lasting or severe case of newborn jaundice or non-immune hemolytic anemia in the past.

If hemolysis has occurred and is linked to an illness or medicine that is thought to oxidize red blood cells, or after receiving haematopoietic stem cells from a donor who is G6PD deficient or whose status is unknown.

- A history of favism; • A history of G6PD deficiency or favism in the family.

- The presence of red blood cells with morphology that can indicate oxidative damage or Heinz body stain positivity.

- Hemoglobinuria, sickle cell disease, thalassemic disorders, or congenital non-spherocytic hemolytic anemia.

Quantitative analysis is required if the screening test results are aberrant or ambiguous, or if the individual is a female. In order to accurately diagnose G6PD deficiency, quantitative techniques adjust G6PD activity for either hemoglobin concentration or red blood cell count (15). Even if the quantitative assay is normal, a cytochemical test should be done on any female suspected of heterozygosity for G6PD deficiency. Identification of heterozygote females is made possible by staining, which makes it possible to see the G6PD-normal and G6PD-deficient red blood cell groups (14). When an acute hemolytic event is present, trying to detect G6PD deficiency is likely to produce unreliable results (1). The assay should be performed two to three months after the hemolytic episode since during these episodes juvenile red cells and reticulocytes have more G6PD activity than mature red cells, leading to false negative results (14).

Results

The average age of the 41 patients was 15.13.6 (1-47) years, with 33 males (80.5%) and 8 women (19.5%) making up the majority of the patient population. Within an hour to seven days prior to the symptom, all individuals had a history of boiling or cooking fresh FB. The primary date for each group is displayed in Table 1. Group 1: There were 25 patients in group 1, with 20 men (80%) and 5 women (20%), and a mean age of 5.95.7(1-26) years. The average age of the 23 children

sent to the pediatric hospital was 4.6 3.2 (1-12) years. The other two patients, two men, were admitted to the general medical ward and ranged in age from 17 to 26 years. Four of the patients may have had favism in the past; of the two, one is a 12-year-old man with PCV 38% and 1.4 mg/dl of bilirubin, and the other is a 3.6-year-old man with PCV 34%. None of the patients in this group have ever undergone a G6PD test. Among them, 17 patients or their families Within two months of admission, they were contacted by cell phone for follow-up and asked to take the G6PD test for confirmation, but only two of them responded. While the other was discovered to have normal G6PD enzyme activity, one of them was determined to be G6PD deficient. PCV was performed on 21 patients, and total serum bilirubin was performed on 16 patients. No direct and indirect bilirubin, full blood workups, ESRs, reticulocyte counts, or coombs tests were performed on any of the patients. According to admission data, the end of the first and beginning of the second weeks of April to the end of the last week of April saw a rise for early scanty cases (Figure 1).

Group 2: There were 16 patients in this group, with 13 men (18%) and 3 women (19%). The average age of the group was 29 years and 9.4 months (17-47). Eight of them remembered the age at which the suggested favism first appeared. In seven of them, it occurred between the ages of 1 and 9, while in one case the attack first appeared at the age of 24. One of the female patients in this group temporarily stops consuming FB and then resumes doing so within 1 to 12 years; another patient stops consuming fresh FB for just three years at which time she continues to consume dried, frozen, and canned FB. In one instance, FB was not at all avoided. Up to this point, two of GP2's patients had avoided Facebook. In this group of 16 patients, 7 were found to have G6PD deficiency, 3 had normal enzyme activity, and the remaining 6 had no G6PD deficiency.

Table 1: The primary date for GP1 and GP2

Characteristic	GP1	GP2	Total /percentage
Number	25	16	41(100%)
Age	5.9 ± 5.7 (1-26)	29±9.4 (17-47)	15±13.6 (1-47)
Men	20	13	33(80.5%)
Women	5	3	8(19.5%)
Ingestion of FB at other time before	17	9	26(63.4)
Re-ingestion of FB after	None	13	13(81.5%of GP2)

proposed Favism			
History of old Favism ,recurrence	4	1	5(12.2%)
Family history of Favism	11	6	17(41.5%)
G6PD test	2	10	12(29.3% of GP2)

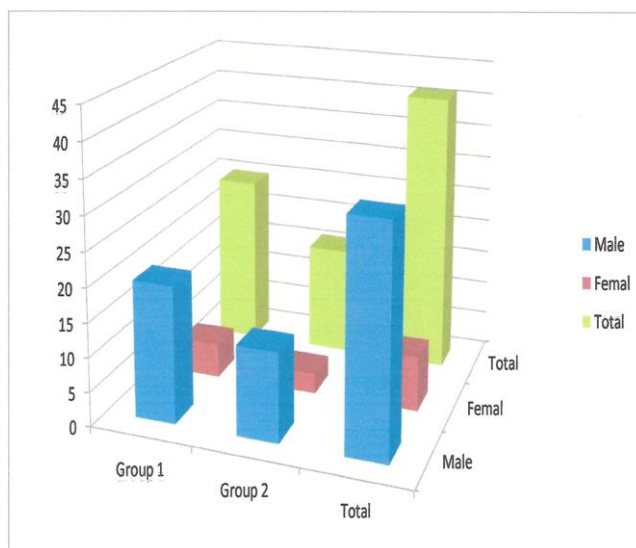
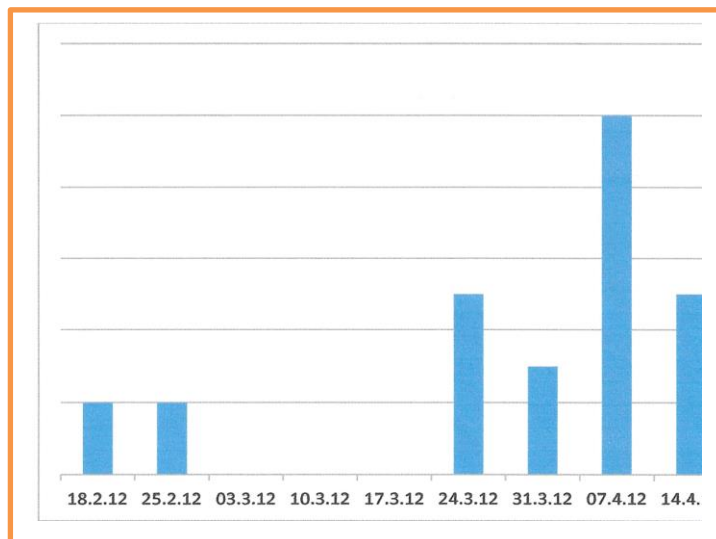


Figure 1: G6PD deficiency adult in Al-Ramadi City according to gender



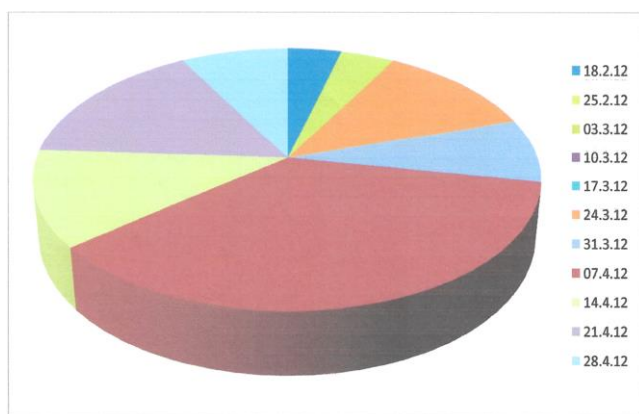


Figure 2: Acute favism admission rate throughout the spring (cases per week)

Discussion

Men predominate, most favism attacks happen in youth, and all cases in two groups happen in the spring during fava bean harvest, according to this study's findings, which are consistent with findings from prior studies. G6PD deficiency must be included in the differential diagnosis of intra- and extravascular hemolysis. A clinically significant latent or asymptomatic G6PD deficiency might only arise under the correct conditions. The catalyst in this case was the ingestion of fava beans (16). Uncertain reasons exist for why G6PD-deficient people do not always experience favism after consuming fava beans. In our situation, the consumption of huge quantities of beans over three days in a row, both as boiling beans alone and in soup, may have had an impact on the development of hemolysis. But in the prior occurrence, which occurred a year earlier, the patient merely ate one tiny meal of fava beans and rice. This shows that fava bean consumption—both in terms of quality and quantity—influences the likelihood of hemolytic episodes (17,18,19).

In acute cases, only hemoglobin and total serum bilirubin tests are used to determine the diagnosis of favism. No reticulocyte count or indirect bilirubin were performed on any acute cases. A huge question mark has been raised about instances that have been classified as favism even though they may refrain from using FB or drugs for a while or their entire lives. None of the acute cases and only a small percentage of the older cases of suggested favism have undergone a G6PD test. According to legend, Pythagoras forbade his disciples from eating fava beans. He eventually opted to enter a field of fava beans, where he was trying to hide, than to be kidnapped by his enemies who were after him (20). All patients ingest boiled or cocked FB before admission and poverty of diagnosis of favism in non-pediatric age group, which is difficult to explain is it real reduction or disappearance of cases, or it is unrecognized milder form. These points show that the basis of diagnosis and follow up of cases in pediatric hospital is poor. Patients

with the designation "favic" who have been told not to consume Facebook We were unable to detect any medication hemolysis in our cases, thus in the future and to prevent a list of pharmaceuticals from being incorrectly identified as indicated above, moreover. A significant question regarding the cause of adult poverty is raised. The results of this investigation just add to the complexity surrounding the genesis of favism. The aforementioned facts cannot be accounted for by toxins, genetic, or immunological variables. The pathophysiology of favism needs to be explained by one or more factors in addition to G6PD deficiency. Divicine and isouramil, compounds found in fava beans, are believed to be the cause of acute hemolysis (also known as favism) because of their oxidizing properties. (21). Most frequently, young children are impacted by favism (22). Favism symptoms include nausea, headache, back discomfort, and fever within 5 to 24 hours following fava bean consumption. Later, jaundice and hemoglobinuria will develop (23).

It is thought that all favism patients have G6PD deficiency, but not all G6PD-deficient people experience hemolysis after consuming fava beans (25); therefore, there may be another characteristic of fava beans and their ingestion that raises the risk of hemolysis. Additionally, it has been reported that moms who consumed fava beans could transmit the disease to their nursing infants (24).

Conclusions: Resuming FB intake after a hemolytic attack is not as harmful as previously thought, and the majority of favic patients forget the sickness over time and do so in a varying amount of time. In Al-Ramadi province, drug-induced hemolytic anemia in favism patients is not an issue. However, the diagnosis of favism in Al-Ramadi city is not reliable and needs to be re-evaluated, thus people who were given the label "favism patient" may not have actually had favism.

REFERENCES

1. Meletis J, Konstantopoulos K., (2004): Favism from the avoid fava beans of Pythagoras to the present. *Haema* ;7(1):17-21.
2. Lim F, Vulliamy T, Abdalla SH., (2005): An Ashkenazi Jewish woman presenting with favism. *J Clin Pathol*. 58:317-9.
3. Schuurman M, van Waardenburg D, Da Costa J, Niemarkt H, Leroy P., (2009): Severe hemolysis and methemoglobinemia following fava beans ingestion in glucose-6-phosphatase dehydrogenase deficiency: case report and literature review. *Eur J Pediatr*. 168:779-82.
4. Benchimol M, Madeira LB, de Oliveira-Souza R., (2018): Late-Life Presentation of Unsuspected G6PD Deficiency. *Case Rep Crit Care*.
5. Diagnosis and management of glucose-6-phosphate dehydrogenase (G6PD) deficiency. (2022). Accessed: January 1.
6. Soyuncu S, Bektas F, Isik S, Yigit O (2011): An unusual syncope cause in the ED: favism. *Hum Exp Toxicol*. 30:335-7.
7. Schick P., (2016) Glucose-6-phosphate dehydrogenase deficiency. *Medscape*. Accessed: June 21, 2017.
8. Glucose-6-phosphate dehydrogenase deficiency. (2017). Accessed: May 5,
9. Bertil Glader, PGree, John Foerster, John N., Lukens. Lippincott Williams and Wilkins (2003): Hereditary hemolytic anemias due to enzyme deficiency: in *Wintrobe's Clinical Hematology*, 11th Ed, Edit.
10. Battistuzzi G, D'Urso M, Toniolo D, Persico GM, Luzzatto L.

- Tissue.,(2008) specific levels of G6PD correlate with methylation at the 3' end of the gene. *Proc Natl Acad Sci U S A* 1985; 82: 1465–69. As cited in Cappellini MD, Fiorelli G. Glucose-6-phosphate dehydrogenase deficiency. *Lancet*, 371: 64–74.
11. Beutler, E.,(2008): Glucose-6-phosphate dehydrogenase deficiency: a historical perspective. *Blood*, 111:16–24.
 12. Ruwende C, Hill A.,(1998) Glucose-6-phosphate dehydrogenase deficiency and malaria. *J Mol Med.* 76:581–588.
 13. Beutler, E.,(2008): Glucose-6-phosphate dehydrogenase deficiency: a historical perspective. *Blood* 2008; 111:16–24.
 14. Roper D, Layton M, Rees D, Lambert C, Vulliamy T, De la Salle B.,(2020)Laboratory diagnosis of G6PD deficiency. A British Society for Haematology Guideline. *British Journal of Haematology.* 189(1):24-38.
 15. Phillips J, Henderson A.C.,(2018): Hemolytic Anemia: Evaluation and Differential Diagnosis. *Am Fam Physician.* 98(6):354-361.
 16. Benchimol M; Madeira, L.B. and de Oliveira-Souza R(2018): Late-Life Presentation of Unsuspected G6PD Deficiency . *Case Rep Crit Care.* 2018:8198565.
 17. Schuurman M; van Waardenburg, D., Da Costa, J; Niemarkt, H., Leroy, P(2009): Severe hemolysis and methemoglobinemia following fava beans ingestion in glucose-6-phosphatase dehydrogenase deficiency: case report and literature review. *Eur J Pediatr.* 168:779-82.
 18. Lim, F; Vulliamy, T and Abdalla, SH(2005): An Ashkenazi Jewish woman presenting with favism . *J Clin Pathol.* 58:317-9.
 19. Luzzatto, L; Ally, M, and Notaro, R,(2020): Glucose-6-phosphate dehydrogenase deficiency. *Blood.* 136:1225-40.
 20. Arie THD. Pythagoras and beans. *Oxf Med School Gaz.* 1959; 11:75-81. As cited in Beutler, E. Glucose-6-phosphate dehydrogenase deficiency: a historical perspective. *Blood* 2008; 111:16–24.
 21. Roper D, Layton M, Rees D, Lambert C, Vulliamy T, De la Salle B et al. Laboratory diagnosis of G6PD deficiency. A British Society for Haematology Guideline. *British Journal of Haematology.* 2020;189(1):24-38.
 22. Hagag ,A.A.; Badraia, I.M.; Elfaragy, M,S.; Abd Elmageed, M,M. and Abo-Ali EA(2018):Study of Glucose-6-Phosphate Dehydrogenase Deficiency: 5 Years Retrospective Egyptian Study. *Endocr Metab Immune Disord Drug Targets.* 18(2):155-162.
 23. Luzzatto, L. and Arese, P.,(2018) Favism and Glucose-6-Phosphate Dehydrogenase Deficiency. *New England Journal of Medicine* 378:60.
 24. Yeruchimovich, M., Shapira, B., Mimouni, F,B., Dollberg, S.(2009):Neonatal nucleated red blood cells in G6PD deficiency. *Am J Perinatol* 2002;19: 215 –8. As cited in Al-Azzam SI, Al-Ajlony MJ, Al-Khateeb T, Alzoubi KH, Mhaidat N, Ayoub A. An audit of the precipitating factors for haemolytic crisis among glucose-6-phosphate dehydrogenase-deficient paediatric patients. *J Med Screen.* 16(4):167-169.
 25. Beutler, E.,(1994)G6PD deficiency. *Blood* ,84:3613–36