

# ***G6PD Deficiency: What Drug Should Be Avoided?***



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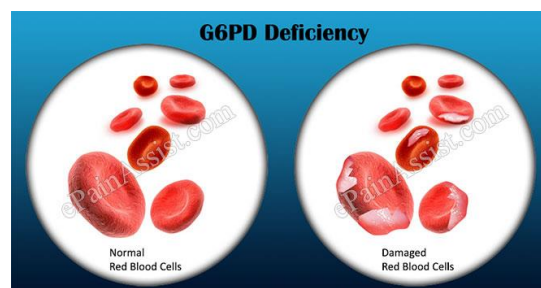
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## What is G6PD Deficiency?

Glucose-6-Phosphatase Dehydrogenase (G6PD) is an essential enzyme in red blood cell (RBC) for assuring its normal life span. RBC depends solely on G6PD activity to protect against dangerous oxidative metabolites. Thus, the deficiency of this enzyme may provoke sudden destruction of RBC and lead to haemolytic anaemia.

G6PD deficiency is the most common enzyme deficiency in humans which affecting around 400 million people worldwide. The deficit is most prevalent in Africa (up to 20% of the population), Mediterranean (4% - 30%) and Southeast Asia.<sup>[1]</sup>

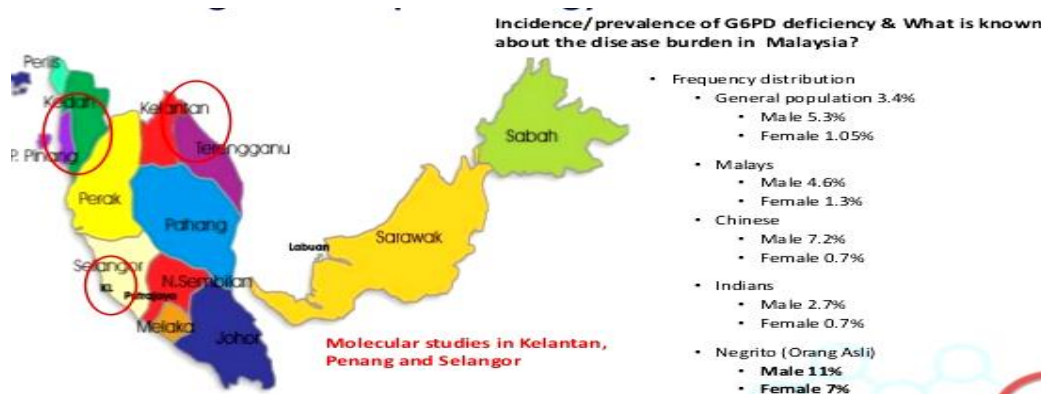


**Figure 1: normal and damaged RBC** <sup>[3]</sup>

It is an X-linked disorder that may be **inherited** from mother (usually a healthy carrier) or affected father to son or daughter. G6PD **cannot be spread** from one person to another.<sup>[6]</sup> You can determine whether you are G6PD deficient by a simple blood test.<sup>[1]</sup>

It is a **lifelong condition**, however G6PD deficient can have a **completely normal life** as long as they avoid triggers such as drugs and chemical exposures that can cause oxidant stress.<sup>[6]</sup>

### Prevalence of G6PD in Malaysia:



**Figure 2: An overview of G6PD deficiency prevalence in Malaysia** <sup>[2]</sup>

## Sign and symptoms of G6PD deficiency

People with G6PD deficiency **do not display** any signs of the disease until they are exposed to certain chemicals in food or drugs whereby their RBC being broken down in excess.



**Figure 3: Sign and Symptoms of G6PD Deficiency**

Other symptoms:

- Sudden rise of body temperature
- Dark yellow-orange urine.
- Weak and rapid pulse rate.

It is common for babies to have jaundice (yellowing of the skin and eyes) in the first week of life, but some babies with G6PD deficiency have jaundice for longer than usual.

### **What to do if experienced symptoms mentioned above?**

- You should either call your physician or pediatrician, or go directly to the nearest hospital.
- You should stop taking any drugs that currently prescribed.
- You would most probably be requested to list all foodstuffs and drugs taken in the preceding 48 hours, so try to recall and list them.



## Do I have G6PD deficiency?

### **How G6PD be diagnosed:**

Indications for testing for glucose-6-phosphate dehydrogenase (G6PD) deficiency:

- Development of hemolysis after taking medications or experiencing conditions that can induce oxidant stress
- Unexplained or prolonged neonatal hyperbilirubinemia
- Non-spherocytic hemolytic anemia

### **Tests for G6PD**

**Main test** for G6PD:

- G6PD test
  - A simple blood test to measure the level of G6PD in blood

**Other tests** for G6PD include the following:

1. Complete blood cell count (CBC) and reticulocyte count
  - Indicate increased bone marrow response to anemia.
2. Lactate dehydrogenase (LDH) level & Indirect and direct bilirubin level
  - Indicate increased RBC destruction.
3. Serum hemoglobin level, Urinalysis for haematuria & Urinary hemosiderin
  - Indicate severe intravascular hemolysis.
4. Peripheral blood smear
  - Routine staining may reveal polychromasia, representing increased RBC production.
  - Bite cells caused by the splenic removal of denatured hemoglobin may be seen.
  - Heinz bodies (denatured hemoglobin) can be seen upon visualized by using a supravital stain (Heinz body prep). .

## Drugs to Avoid in G6PD Deficiency

Pharmacological group	Drugs	Examples	Risk level
<b>Amino Acids</b>	<ul style="list-style-type: none"> <li>Arginine</li> </ul>	L-Arginine supplement	Low
	<ul style="list-style-type: none"> <li>Aspirin</li> </ul>	Millispirin, Cardiprin	High
	<ul style="list-style-type: none"> <li>NSAIDs</li> </ul>		
	<ul style="list-style-type: none"> <li>- Metamizole</li> </ul>	Nolotil, Metamizole sodium Inj	High
	<ul style="list-style-type: none"> <li>- Phenazone</li> </ul>	Tropex Ear Drops	Low
	<ul style="list-style-type: none"> <li>- Phenylbutazone</li> </ul>	Butasyl Inj	Low
	<ul style="list-style-type: none"> <li>- Tiaprofenic Acid</li> </ul>	Surgam 300	Low
	<ul style="list-style-type: none"> <li>Paracetamol</li> </ul>	Panadol, Actimol, Uphamol	Low
	<ul style="list-style-type: none"> <li>Phenazopyridine</li> </ul>	Pyridium, Phenazo	High
	<ul style="list-style-type: none"> <li>Chloramphenicol</li> </ul>	Nicol Eye Drops, Chlorop Eye Ointment	High
	<ul style="list-style-type: none"> <li>Nitrofurantoin</li> </ul>		
	<ul style="list-style-type: none"> <li>- Nitrofurantoin</li> </ul>	APO-Nitrofurantoin	High
	<ul style="list-style-type: none"> <li>Quinolones</li> </ul>		
	<ul style="list-style-type: none"> <li>- Ciprofloxacin</li> </ul>	Ciprobay, Ciflox Eye Drops	High
	<ul style="list-style-type: none"> <li>- Levofloxacin</li> </ul>	Levoquin, Glevo Inj, Cravit, Loxof	High
	<ul style="list-style-type: none"> <li>- Moxifloxacin</li> </ul>	Avelox, Vigamox Eye Drops	High
	<ul style="list-style-type: none"> <li>- Norfloxacin</li> </ul>	Janacin, Norfox, Chibroxin Eye Drops	Low
	<ul style="list-style-type: none"> <li>- Ofloxacin</li> </ul>	Tarivid	High
	<ul style="list-style-type: none"> <li>Sulfonamides</li> </ul>		
	<ul style="list-style-type: none"> <li>- Sulfadiazine</li> </ul>	Flumazine, Sulpatrim Oral Suspension	Low
	<ul style="list-style-type: none"> <li>- Sulfadimidine</li> </ul>	Trimesul Powder, Tylan 40 Sulfa-G Premix	High
	<ul style="list-style-type: none"> <li>- Sulfadoxine</li> </ul>	Fansidar	Low
	<ul style="list-style-type: none"> <li>- Sulfamethoxazole</li> </ul>	CenST 240 Oral Suspension, Zoltrim	High
	<ul style="list-style-type: none"> <li>Trimethoprim</li> </ul>	CenST 240 Oral Suspension, Zoltrim	Low
<b>Anticonvulsants</b>	<ul style="list-style-type: none"> <li>Phenytoin</li> </ul>	Dilantin	Low
<b>Antidiabetics</b>	<ul style="list-style-type: none"> <li>Glibenclamide</li> </ul>	Glucomin- G, Daonil, Benil	High
<b>Antidotes</b>	<ul style="list-style-type: none"> <li>Dimercapol</li> </ul>	Dimercaprol Inj	High

<b>Pharmacological group</b>	<b>Drugs</b>	<b>Examples</b>	<b>Risk level</b>
<b>Antiglaucoma</b>	• Acetazolamide	APO-Acetazolamide	Low
	• Brinzolamide	Simbrinza Eye Drop, Azopt Eye Drop	High
	• Dorzolamide	Lamisopt Eye Drop, Trusopt Eye Drop	High
<b>Antihistamine</b>	• Antazoline	Shinallerg Eye Drop	Low
	• Diphenhydramine	Bena expectorant	Low
<b>Antimalarials</b>	• Chloroquine	AXCEL Chloroquine Tablet	High
	• Primaquine	Pharmaniaga primaquine Tablet	High
	• Proguanil	Malarone	Low
	• Pyrimethamine	Rhobazin Plus Solution, Coxicin	Low
	• Quinine	Quinine Dihydrochloride Inj, Quinine Sulfate Tab	Low
<b>Anti-mycobacterials</b>	• Dapsone	Pharmaniaga dapsone	High
	• Isoniazid	Akurit, Pharmaniaga Isoniazid	Low
	• Streptomycin	Streptin, Spectivet 50% Water Soluble Powder	Low
<b>Antineoplastic Agents</b>	• Doxorubicin	Caelyx, Lipo-Dox Liposome Inj, Adriamycin	High
<b>Antiparkinsonism Agents</b>	• Levodopa	Sinemet, Madopar, Stavelo	Low
<b>Cardiac Drugs</b>	• Procainamide	Procanbid, Pronestyl	Low
	• Quinidine	Quinidine Gluconate	Low
<b>Diagnostic Agent for Cancer</b>	• Tolonium Cl	Xerac-AC, Equalyte	High
<b>Gout preparations</b>	• Colchicine	Tolchicine, Goutnor	Low
	• Probenecid	Probenecid Tablet	High
<b>Sulfonamide-containing Anti-inflammatory</b>	• Sulfasalazine	SAZO EN	High
	• Menadione	Aekol, Introvit-K3	High
	• Phytomenadione	KISAN, Vitalipid N	Low
<b>Vitamins</b>	• Ascorbic Acid	Vitamin C Supplement	High

\*All drugs are given in Nomenclature based on INN (International Nonproprietary Name)

\*Low risk: May considered safe in most cases if given in normal therapeutic doses.

Hemolysis may occur when taken in large doses.

**Table 1: Drugs to Avoid in G6PD Deficiency**

### **Foods and chemicals to be avoided;**

- Fava Beans (broad beans)
- Red wine
- Henna dyes used for tattoo & Hair
- Blueberries [also yogurts containing these],
- Soya products
- Tonic water
- Naphthalene (moth balls)

**Whether you should avoid any of these would depend on your enzyme deficit level and mutation.**

### **Tips for parents**

- ✓ If your child has been diagnosed with G6PD deficiency, take them to be checked by a GP whenever any of the following symptoms develop:
  - jaundice (yellow skin and eyes)
  - dark coloured urine
  - Anaemia (pale skin and lethargy).
- ✓ Do not ignore infections. Persistent fever signals an infection. Bring the child at once to his pediatrician
- ✓ Make sure people who are taking care after child (school, kindergarten, child care, babysitters, health professionals) should know about your child's condition.
- ✓ As your child gets older, honestly and gently tell him about his condition and teach him to be careful about what he eats.
- ✓ Best is to carry with you the "Drugs to Avoid in G6PD Deficiency" list and show it to all those who may treat your child.



## Frequently asked Questions and Answers

### **1) How did my child get G6PD deficiency?**

G6PD deficiency is an inherited disease (passed on from previous generations), and cannot be caught by being in contact with someone else. G6PD deficiency is more common in some racial groups, for example, people with African, Asian or Mediterranean heritage.

In Malaysia, the prevalence of G6PD Deficiency is shown in Figure 2 with general population of 3.4%, most common in Orang Asli then followed by Chinese and Malays and least common in Indians.

### **2) What are the chances of passing it on to my kids?**

A) If the father is unaffected (healthy) and the mother is a carrier (no clinical symptoms):

- One daughter out of two will be a carrier
- One son out of two will be G6PD deficient

B) If the father is G6PD deficient and the mother is unaffected:

- All daughters will be carriers
- All sons will be unaffected

C) If the father is G6PD deficient and the mother is a carrier:

- One daughter out of two will be G6PD deficient
- One daughter out of two will be a carrier
- One son out of two will be G6PD deficient
- One son out of two will be unaffected

D) If the father is unaffected and the mother is G6PD deficient:

- All daughters will be carriers
- All sons will be G6PD deficient

E) If both father and mother are G6PD deficient:

- All daughters will be G6PD deficient
- All sons will be G6PD deficient



**3) Should I give my child iron tablets to prevent anaemia?**

Never give a child with G6PD deficiency any medicine (including complementary medicines) or tablets without consulting with your doctor first. It is safe for children with G6PD deficiency to take iron, but iron should only be prescribed when the anaemia is confirmed as being due to iron deficiency.

**4) What precautions can I take to ensure my health living with G6PD Deficiency?**

Do not take any of the medications listed above. Always tell any health provider you see that you have G6PD Deficiency.

**5) Can I donate blood if I have G6PD Deficiency?**

The WHO has recommended that donors with known G6PD deficiency but no history of hemolysis be accepted, but that the blood not be used for intrauterine or neonatal transfusion

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