

Drugs and Time

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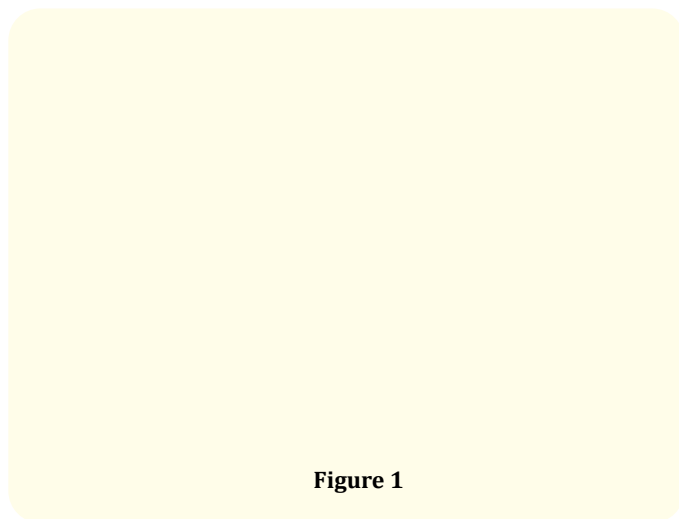


Figure 1

What are medicines?

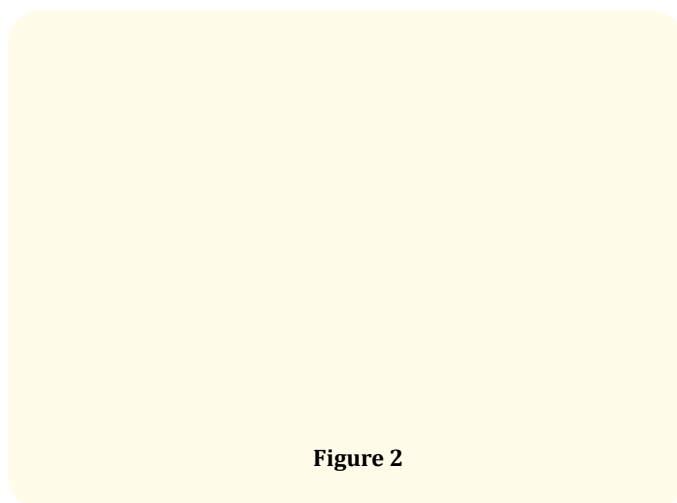


Figure 2

Did you know some of the deaths worldwide is due to medication errors by patients?

My greatest concern for patients is to experience the best efficacy of drugs.

Ensuring medicines are used safely is a vital need in the effectiveness of a medication since some of the unplanned admissions to hospitals are due to medication errors by patients.

This information has been simplified to suit the layman's perspective and to help patients to have basic knowledge about drugs and how to administer them to attain best results. As time is very significant in the day to day activities of man, so it is important in the administration of drugs to achieve desirable results.

Medicines are substances when taken, inhaled, injected or applied on the body alter the state of the body positively or negatively depending on the dose and how it was administered. An example is paracetamol tablet 500mg.

Why do we administer medicines?

Medicines are administered in order to

- Treat a disease or illness
- Prevent a disease or illness
- Diagnose a disease or condition
- Keep you healthy
- Alleviate the symptoms of a disease or condition
- Modify bodily function

Why is time so important in the administration of medicines?

Figure 3

Efficacy of a drug is the ability of the drug to produce its desired effects. The efficacy of drugs is dependent on how the drugs are administered of which TIME IS A KEY FACTOR.

Time is a key factor in the administration of drugs; therefore, for drugs to produce their highest efficacy, they must be administered on time which must be very consistent until the last dose of the drug is used. When a drug is administered; for example, a drug like paracetamol tablet 500mg, it undergoes a series of processes in the body to produce its desired effects which include; absorption, distribution, metabolism and elimination.

Absorption

The prescribed drug is absorbed from the site of administration such as the oral route(mouth) which permits the entry of the Active Pharmaceutical Ingredient(API) into the blood plasma. Basically, it is the movement of the drug into the bloodstream after administration. Using the cited example which is paracetamol tablet 500mg, when taken is absorbed through the gastrointestinal tract (which includes the mouth, esophagus, stomach and intestines).

Distribution

The extent to which the administered drug will spread within the body. Example paracetamol is distributed through most tissues and fluids.

Metabolism

It is the process by which the body breaks down the administered drug into its active and inactive components. Example paracetamol is extensively metabolized in the liver.

Elimination

The volume of blood cleared of the drug per unit time, hence the amount of the administered drug that leaves the body after some-time. Example Paracetamol is excreted through the kidneys in the urine.

Drugs must be taken on TIME to ensure that an effective quantity of it is always present in the body until the last dose of the drug is used. When drugs are not administered on time, the levels in the blood can be too low to effectively stop the organism (bacteria, virus etc.) from multiplying. As a result, it enables the organism to be resistant to the effects of the drug. The levels of the administered drug in the blood can also be too high leading to toxicity.

Dosing times must always be noted; such as every 24hours, a drug needs to be taken once (example at 8:00 AM) daily, every 12hours, a drug needs to be taken twice (example at 8:00 AM and 8:00 PM) daily, every 8hours, a drug needs to be taken three times (example at 6:00 AM, 2:00 PM and 10:00 PM) daily, every 6hours a drug needs to be taken four times (example at 6:00 AM, 12:00 PM, 6:00 PM and 12:00 AM) daily and the time must be maintained until the last dose of the drug is used for effective results even if you have to set an alarm and wake up to make sure you follow the schedule stated by your pharmacist.

The most important thing to do is to maintain the dose interval such as 24 hours, 12 hours, 8 hours etc; but the time must be scheduled by the pharmacist or physician to suit the patient.

What is half-life of a drug?

- These are additional information to know about drugs such as paracetamol tablet 500mg.
- When a drug is administered, the body in its own way tries to clear the drug from the blood. Drugs are manufactured in such a way that before the body tries to clear the drug from the blood, the drug has already exerted its effects. This is what half-life is about.
- Every drug has a half-life which is the time needed for clearance of HALF (50%) of the drug from the body after the drug has been administered.
- For the example cited which is paracetamol tablet 500mg, it has a half-life of 1 to 4 hours after administration, which means that after the administration of paracetamol tablet 500mg and within 1 to 4 hours of administration, half of the drug will be cleared from the blood through the kidneys in the urine. Halflife is specific for every drug.

- The halflife of some drugs can be 6 hours, 8 hours, 12 hours or even 24 hours. For an administered drug to produce a desired effect, the dose interval must be noted and must be consistent from dose to dose.
- From the above explanation it shows that when drugs are not administered on time it can affect how the drug will work in the body which may be very dangerous to the health of the individual.
- Example paracetamol tablet 500mg is prescribed for a patient to take two tablets 8 hourly (three times daily) and the pharmacist or physician has scheduled a time to suite the patient such as 6:00 AM, 2:00 PM and 10:00 PM to maintain the 8 hours interval but the patient does not obey the scheduled time and takes the drug anyhow say at 6:00 AM, 10:00 AM and 2:00 PM, since the first dose of the drug has not been completely cleared from the body there will be accumulation of the drug in the blood causing toxicity which may affect the health of the individual.
- Note that if you forget a dose, take it as soon as you remember. However, if it is close to the time of your next dose, skip the next dose and resume your schedule. Always remember not to double the next dose because it can cause severe side effects or can even lead to death.
- This shows that time in the administration of drugs is integral for its efficacy.

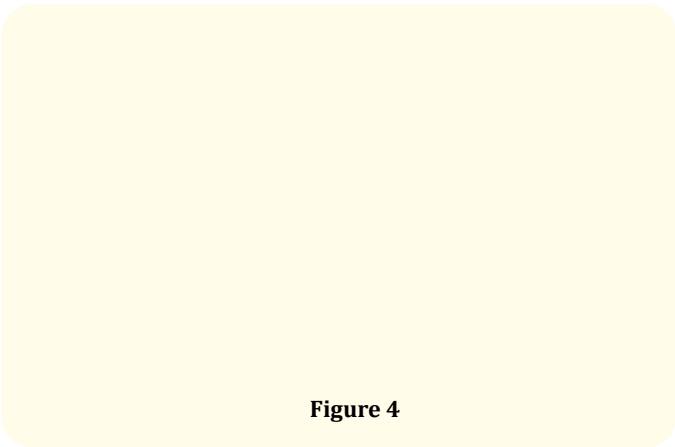


Figure 4

Why are some drugs labelled after meals, before meals, avoid alcohol and milk?

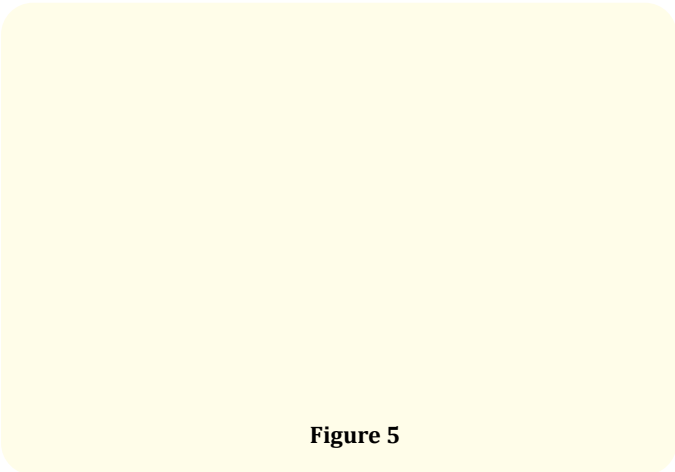


Figure 5

After meals

Due to the irritating nature of some drugs, they are taken after food to reduce the irritation which could lead to indigestion, stomach inflammation or ulcers. Aside that, some medications require food in the stomach and the gut for the body to absorb them properly. For example, drugs for diabetes such as metformin, should be taken after food.

Before meals

Some drugs are taken before food or on an empty stomach because food can affect the efficacy of the drugs such as the absorption of the drugs making them less effective. Some foods can interact with drugs either by increasing or decreasing the amount of drug in the blood to potentially dangerous levels or levels that are too low to be effective.

Avoid milk when taking some antibiotics such as tetracycline, doxycycline and ciprofloxacin. Calcium in dairy products such as milk, cheese, yogurt etc, can interfere with drugs. Calcium will bind to drugs or antibiotics such as ciprofloxacin and prevent absorption into the body.

Avoid alcohol when taking drugs such as antibiotics example ciprofloxacin, sedatives example diazepam, antidepressants example fluoxetine, non-steroidal anti-inflammatory drugs(NSAIDS) of which many people know as painkillers example ibuprofen.

Alcohol as a depressant, affects how the brain works

Drugs such as diazepam affect the way the brain works, so taking alcohol with such drugs will increase the sedative effect of both causing dizziness. Sometimes it could also affect the way the brain responds to the drug making it less effective. Alcohol also affects the way drugs are absorbed in the body and broken down in the liver. If alcohol is consumed, the liver produces enzymes or chemicals to get rid of the alcohol faster and the same enzyme can break down the drugs making it less effective or causing the drug not to produce the desired effects.

Alcohol with antibiotics such as metronidazole and tinidazole can lead to nausea, vomiting, flushing of the skin, accelerated heart rate or shortness of breath. This is because they can interfere with the breakdown of alcohol leading to severe side effects.

Alcohol increases the production of gastric acid in the stomach which can lead to inflammation of the stomach lining and can cause ulcer. Taking alcohol with NSAIDS such as ibuprofen which also has a side effect of ulcer can lead to severe damaging of the stomach lining and intensifying those effects.

Why you must avoid the over dose, under dose and self medication of drugs?

Most patients tend to ignore the advice of their pharmacist or physician concerning the use of their medications, so they end up increasing the dose (quantity) or reducing the dose for their own

reasons of which I may not know but maybe the medications are too many for them to use or they think increasing the dose will give them a quick relief meanwhile they do not understand how drugs works in the body.

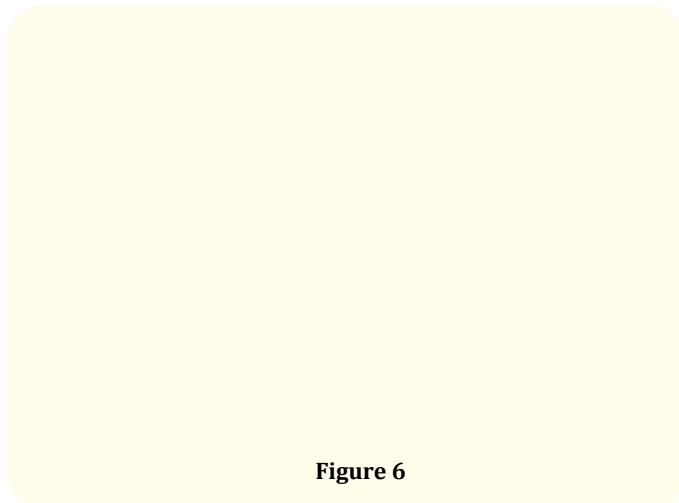


Figure 6

Drug over dose

Drug overdose is when the dose of a prescribed drug is increased beyond which must be administered at a time or daily.

- Patients sometimes double the dose of their medications so that they can actually reduce the number of days they are supposed to administer the drug which is very dangerous to the health of the patient.
- For example, a drug like paracetamol tablet 500mg is taken 1g four times daily meaning that the daily maximum dose for paracetamol tablet 500mg is 4g which is 8 tablets daily in four divided doses. Beyond this is going to cause toxicity which will lead to death if not rushed to the nearest hospital within 10hours.

Drug under dose

This is when the dose of a prescribed drug is reduced below which must be administered at a time or on a daily basis and is very dangerous just as the overdose of the drug.

- For example, drugs such as antibiotics example ciprofloxacin when taken below the stated normal dose can cause the bacteria to develop resistance to the drug.
- This is because the quantity of the drug present in the blood plasma at every time is not enough to suppress or kill the bacteria. This is when patients complain that they have administered the drug several times but they are not obtaining the desired results.

Self-medication

This is the administration of drugs by patients to treat common illnesses without consulting a physician or a pharmacist.

- Patients tend to administer drugs for a long period of time beyond the stated duration for which the drug should be administered.
- Patients mostly abuse painkillers such as ibuprofen, paracetamol, diclofenac, naproxen etc which is very dangerous.

Why should drugs be stored properly?

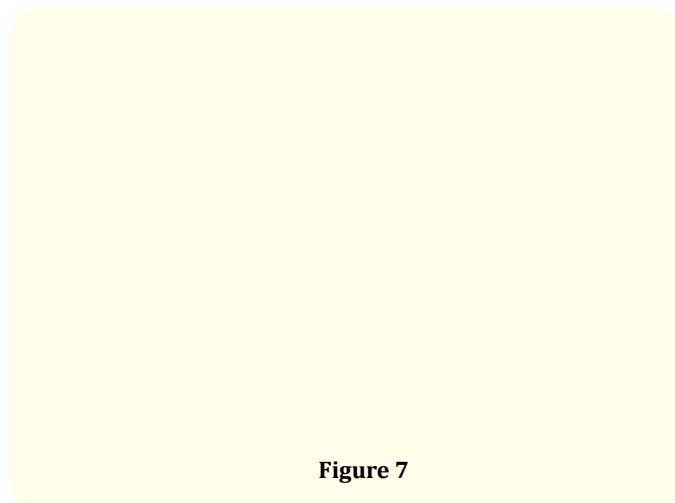


Figure 7

- Last but not the least, to obtain the best effects of drugs, the storage conditions should be strictly noted. Storing drugs properly can help to ensure the drugs work effectively and to prevent poisoning.
- Exposure of drugs to inappropriate conditions such as heat, light, air, moisture may render them ineffective or harmful when administered. This is because some drugs are light sensitive so exposure to light can affect the efficacy of the drug making it less effective. Most drugs are stored at room temperature which is between 15°C to 25°C. Suspensions, some eye drops, insulin injections must always be kept in a refrigerator.
- In my subsequent blog, I will delve more into alcohol and also explain into detail how to store and use your medications such as antihypertensive, antidiabetics, NSAIDS, antihistamines, etc.

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