POSOLOGY

(Unit Objective: student able to understand the dose or quantity of drugs which can be administered to a patient to get the desired pharmacological action.)

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Introduction

- Posology: (Derived from the greek words Posos- how much, and logos means science).

- Posology is a branch of medical science which deals with dose or quantity of drugs which can be administered to a patient to get the desired pharmacological action.

- The dose of a drug cannot be fixed rigidly bec. Various factors are responsible i.e age, sex, severity of the disease etc.

- The official doses in pharmacopoeia represent the average range of quty. Suitable for adults which is administered orally within 24 hrs.

- When other routes of administration are followed the relevant appropriate dose is given.

Factors Influencing Dose

1Age
2 Sex
3Body weight
4Route of administration
5.Time of administration
6.Enviourmental factor
7.Emotinal factor
8.Presence of disease
9.Accumulation
10.Additive effect
11.Synergism
12.Antagonism
13.Idiosyncrasy
14.Tolerance
15.Tachyphylaxis
16.Metabolic disturbance

Factors Influencing Dose

- **Age:**

- The pharmacokinetics of many drugs changes with age.

- Newborn infants (pediatric) are abnormally sensitive to certain drugs because of the immature state of their hepatic and renal function by which drugs are inactivated and eliminated from the body. Failure to detoxify and eliminate drugs results in their accumulation in the tissues to a toxic level.

- Whereas, elderly patients are more sensitive to some drug effect e.g. hypnotics which may produce confusion state in them.

Factors Influencing Dose

- **Sex:**

- Women do not always respond to the action of drug in the same manner as it done in men.

- Special care should be taken when drugs are administered during menstruation, pregnancy & lactation.

- The strong purgative eg. Aloes should be avoided during menstruation.

- Similarly the drugs which may stimulate the uterine smooth muscles e.g. drastic purgative, antimalarial drugs, ergot alkaloids are contra indicated during pregnancy.

- Alcohol, barbiturate, narcotic drugs acts on foetus through placenta.

- During lactation, morphine, tetracycline avoided because its affect on babies.

Factors Influencing Dose

- **Body weight:**

- The average dose is mentioned either in terms of mg per kg body weight.

- Another technique used as a total single for an adult weighing between 50-100kg.

- However, the dose expressed in this fashion may not apply in case of obese patients, children & malnourished patients. It should be calculated according to body weight.

Factors Influencing Dose

- **Route of administration:**

- I.V doses of drug are usually smaller than the oral doses, bec…

- Intravenous route this might enhance the chances of drug toxicity.

- The effectiveness of drug formulation is generally controlled by the route of administration.

Factors Influencing Dose

- **Time of administration:**

- The presence of food in the stomach delay the absorption of drug & rapidly absorbed from the empty stomach.

- But it does not mean that much effective when taken during or after meal.

- Iron, arsenic & cod-liver oil should be given after meal & antacid drugs taken before meal.

Factors Influencing Dose

- **Environmental factors:**

- The personality & behavior of a physician may influence the effect of drug especially the drugs which are intended for use in a psychosomatic disorders.

- The females are more emotional than male & required less dose of certain drugs.

- Inert dosage forms called placebos which resemble the actual medicament in the physical properties are known to produce therapeutic benefit in disease like angina pectoris & bronchial asthma.

Factors Influencing Dose

- **Presence of disease:**

- Drugs like barbiturates & chlorpromazine may produce unusually prolonged effect in patient having liver cirrhosis.

- Such as, streptomycin produce toxic effect on these patient their kidney function is not working properly because streptomycin excreted through kidney.

Factors Influencing Dose

- **Accumulation**:

- Some drugs produces the toxic effect if it is repeatedly administered for long time e.g. digitalis, emetine, heavy metals because these drugs excreted slowly.

- This occurs due to accumulative effect of the drug.

Factors Influencing Dose

- **Additive effect:**
  - When two or more drugs administered together is equivalent to sum of their individual pharmacological action, the phenomenon is called as additive effect.
  - E.g ephedrine & aminophylline in the treatment of bronchial ashtma.
- **Synergism:**
  - When desired therapeutic result needed is difficult to achieve with single drug at that time two or more drugs are used in the combination form for increasing their action this phenomenon is called synergism.
  - E.g. procaine & adrenaline combination, increase the duration of action of procaine.

Factors Influencing Dose

- **Antagonism:**

- When the action of one drug is opposed by the other drug on the same physiological system is known as drug antagonism.

- The use of antagonistic response to drugs is valuable in the treatment of poisoning.

- E.g. milk of magnesia is given in acid poisoning where alkaline effect of milk of magnesia neutralise the effect of acid poisoning.

- When adrenaline & acetylcholine are given together, they neutralise the effect of each other due to antagonism because adrenaline is vasoconstrictor & acetylcholine is vasodilator.

Factors Influencing Dose

- **Idiosyncrasy:**
- Idiosyncrasy is also called as allergy.
- An extraordinary response to a drug which is different from its characteristic pharmacological action is called idiosyncrasy.
- E.g. small quty. of aspirin may cause gastric hemorrhage.
- E.g some persons are sensitive to penicillin & sulphonamide because they produce severe toxic effect.

Factors Influencing Dose

- **Tolerance:**

- When an unusually large dose of a drug is required to elicit an affect ordinarily produced by the normal therapeutic dose of the drug, the phenomenon is called as drug tolerance.

- E.g. smokers can tolerate nicotine, alcoholic can tolerate large quantity of alcohol.

- The drug tolerance is of two types:
- True tolerance, which is produced by oral & parenteral administration of the drug.

- Pseudo tolerance, which is produced only to the oral route of administration.

Factors Influencing Dose

- **Tachyphylaxis:**

- When some drugs administered repeatedly at short intervals, the cell receptors get blocked up & pharmacological response to that drug decreased.

- The decreased response cannot be reversed by increasing the dose this phenomenon is called tachyphylaxis or acute tolerance.

- E.g. ephedrine given repeated dose at short intervals in the treatment of bronchial asthma may produce very less response due to tachyphylaxis.

Factors Influencing Dose

- **Metabolic disturbance:**

- Changes in water electrolyte balance & acid base balance, body temperature & other physiological factor may modify the effect of drug.

- E.g. salicylates reduce body temperature in only in case an individual has rise in body temperature. They have no antipyretic effect if the body temperature is normal.

Calculation of Doses

- The dose of a drug given in the pharmacopoeia represents the average max.quty of drugs which can be administered to an adult orally within 24 hrs.

- The doses are also calculated in proportionate to age, body weight & surface area of the patient.

Cont..

- **Dose proportionate to age**: There are number of methods by which the dose for a child can be calculated from the adult dose

1. Young's formula
2. Dilling's Formula
3. Fried's formula
4. Cowling's formula

1. **Young's formula** : This formula used for calculating the dose for children's under 12 years of age.

$$\text{Dose for the child} = \frac{\text{Age in years}}{\text{Age in years} + 12} \times \text{Adult dose}$$

Cont..

2. **Dilling's formula:** This formula is used for calculating the doses for children in between 4 to 20 years. This formula is considered better because it is easier & quick to calculate the dose.

$$\text{Dose for the child} = \frac{\text{Age in years}}{20} \times \text{Adult dose}$$

3. **Fried's Formula** : This formula is used for calculating of dose for infants up to 2 years.

$$\text{Dose for infant's} = \frac{\text{Age in months}}{150} \times \text{Adult dose}$$

Cont..

4. Cowling's formula:

$$\text{Dose for child} = \frac{\text{Age at next birthday (in years)}}{24} \times \text{Adult dose}$$

- **Dose proportionate to body weight:** Clark's formula used to calculate the dose on body weight.

$$\text{Dose for the child} = \frac{\text{Childs weight in Kg}}{70} \times \text{Adult dose}$$

Cont..

- **Dose proportionate to surface area :** In this method dose is calculated accordingly to surface area it's the more satisfactory & appropriate method than based on age method.

$$\text{Percentage of adult dose} = \frac{\text{Surface area of child}}{\text{Surface area of adult}} \times 100$$

or

- **Catzel's formula:**

$$\text{Dose for patient} = \frac{\text{Surface area of patient in } M^2}{1.73\ M^2} \times \text{Adult dose}$$

where, $1.73\ M^2$ = Average adult surface area

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Thank you