

RECENT REVIEW ON PARENTERAL PRODUCTS- STERILE DOSAGE FORM.

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ABSTRACT

The parenteral routes are used for quick drug action is preferred, as emergencies when patient is uncooperative, unconscious, or not capable to admit tolerate oral medication. Parenteral preparations are those pharmaceutical product that are administered by other than oral routes. Transfusion fluid and injections are parenteral preparations. Typically a sterile drug contains no viable micro-organisms and is nonpyrogenic. Drugs for intravenous injection for irrigation and those used as ophthalmic preparations meet these criteria. In addition, other dosage forms might be labeled as sterile, for instance an ointment applied to a puncture wound or skin abrasion.

KEYWORDS- Parenteral drug delivery, sterilization, Route of administration.

INTRODUCTION- Parenteral products are steriles, liquids which free from pyrogen or solid dosage forms composed of one or more active excipient, packaged in single-dose or multidose containers. They are administration by injection, infusion, or implantation into the body. ⁽¹⁾ The term parenteral is derived from the Greek words para, meaning beside, and enterom, meaning intestine, which together indicate something done outside of the intestine and not by way of the alimentary tract. A drug administered parenterally is on injected through the hollow of a fine needle into the body at various sit and to various depths. The three primary routes of parenteral administration are subcutaneous, intramuscular, and intravenous, although there are others, such as intracardiac and intraspinal. ⁽²⁾ Injections are sterile solutions or suspension of drugs in aqueous or oily vehicle ment for introduction into the body by means of an injectible needle under or through one or more layers of the skin or mucous membrane. Injection should be sterile, isotonic and free from foreign particles, such as dust, fibers etc. They must be introduced through the same route the same route for which they are planned. For example, an oily suspension meant for intramuscular injection may be very dangerous if it is administered by intravenous injections. Similarly, those strong drugs which are necessary to be given through intramuscular injection may prove very critical if it is given by intravenous route. ⁽³⁾ The parenteral preparations are free from the contaminating microorganism. Among these sterile dosage forms are the various small and large volume injectible preparations, irrigation fluid intended to bathe body wounds or surgical openings, and dialysis solutions. Biologic preparation,including vaccines, toxoids, and antitoxins. Sterility in these preparations is essential because they are placed in direct contact with the internal body fluids or tissues, where infection can easily arise. ⁽⁴⁾ Parenteral dosage form are those dosage form which drugs are directly injected into body tissue through one or more layer of skin and mucous. Injections are sterile, pyrogen free preparation intended to be administered parenterally. The term parenteral refers to the injectible routes of administration. ⁽⁵⁾

ROUTES OF ADMINISTRATION OF PARENTERAL PRODUCT

There are various routes of administration of parenteral preparations are as follows:-

- 1. INTRADERMAL INJECTIONS:-** These are given in between dermis and epidermis. Skin of the left forearm is usually selected for given injection. Generally, 0.1 to 0.2 ml of parenteral solution is injected by this route. The route is used for diagnostic purposes and for testing the sensitivity of the injectables.
- 2. SUBCUTANEOUS INJECTIONS:-** These are made under the skin, into the subcutaneous tissue. The volume of 1.0ml or less, is usually injected into the upper arm. This is most important route, because it is convenient for the patient and the doctor.
- 3. INTRAMUSCULAR INJECTIONS:-** These injections are given into the muscular tissues. The muscles of the shoulder, thigh or buttock are usually selected. Mostly, volume upto 2.0 ml is administered by this route and should not exceed 4.0 ml at one site. Aqueous or oily suspensions and oily solutions can be administered by this route.



- 4. INTRAVENOUS INJECTION:-** These injections are given into vein and therefore introduced directly into the blood stream. The median basilica vein near the anterior surface of the elbow is usually selected, because it is easily located and connects with the major veins of the arm. Large volume of parenteral solutions ranging from 1 ml to 500 ml or more than that can be injected. The parenteral solution should be isotonic with blood if the volumes of more than 15 ml should be injected. The suspensions and oily injections cannot be injected by this route.



There are about 40% of all the drugs administered in the hospitals given in the form of injections and its used for increasing. The Part of this increase in parenteral therapy is due to the various use of intravenous fluids. The IV fluids regular to remain as means of fluid alternate, electrolyte balance restoration, supplementary nutrition and they also used as vehicles for vary finding greater use as means of administering other drugs because of convenience the means to reducing the annoyance possible of drugs and the desirability for regular and intermittent drug therapy.

- 5. INTRA-ARTERIAL INJECTIONS:-** These are similar to intravenous injections and are occasionally used for an immediate effect in a peripheral area. These injections are given directly into the artery.



6. **INTRACARDIAC INJECTION:-** These are given into the heart muscle or ventricle in an emergency only for example as a stimulant following cardiac arrest.
7. **INTRATHECAL INJECTION:-** These injections are made into subarachnoid spinal anaesthesia.
8. **INTRACISTERNAL INJECTIONS:-** These injections are given in between the first and second cervical vertebrae. This route is used to withdraw C.S.F. for diagnostic purposes.
9. **INTRA-ARTICULAR INJECTIONS:-** These are given into the liquid that lubricate the articulating ends of bones in a joint.
10. **INTRACEREBRAL INJECTIONS:-** These are given into cerebrum. ⁽⁶⁾

TYPE OF PARENTERAL PREPARATIONS

Parenteral preparations may be classified various type :

1. Solution ready for injection.
2. Suspension ready for injection.
3. Emulsion appropriate for parenteral administration.
4. Dry soluble product which are dissolved in a appropriate solvent directly before its administration.
5. Dry insoluble products which are shared with a apposite vehicle just before its administration. ⁽⁷⁾

ADVANTAGES:-

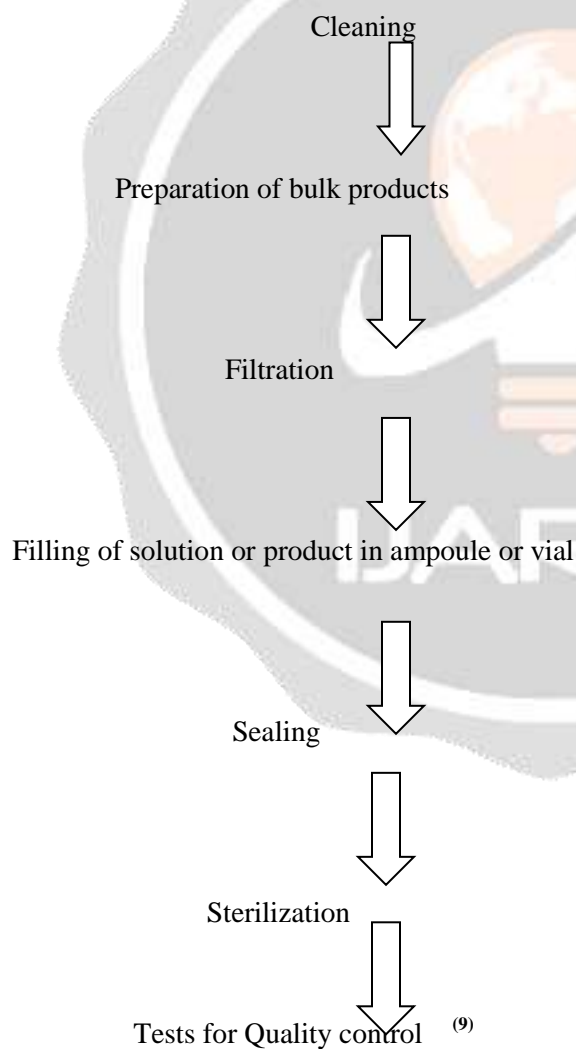
- Onset of action is quick.
- Fast onset of action 15-30 seconds for intravenous route , 3-5 minutes for intramuscular and subcutaneous route.
- 100% bioavailability for intravenous route.
- The suitable for drugs are not absorbed by the gut or those that are too irritant.
- Intreavenous can deliver regular medication, e.g. morphine for patients in regular pain, or saline drip and glucose fore to peoples needing fluids and nutrients.
- The parenteral product useful for unconscious and vomiting patient.
- The parenteral products are suitable for drug, which are inactivated by gastro intestinal tract or enzymes.
- Drug action can be prolonged by modifying the formulation.
- Onset of action is fast, so high risk of addiction when it comes to injecting drugs of abuse.
- The patient is not self administer, so the patients need trained person.
- Trumatic injury from the insertion of needle.
- Potential for introducing:
 - a) Toxic agents,

- b) Microbes,
- C) Pyrogens,
- Need for strict asepsis.
- If it not done properly, potentially harmful air bubbles can occur.
- If the needle is shared, there is risk of HIV and many other infectious diseases.
- Correct syringe, needle and technique must be used. ⁽⁶⁾

TEST FOR THE STERILITY OF THE PRODUCT

Sterility testing assesses whether a sterilized pharmaceutical product is free from microorganism by counting all part of the product through a nutrient medium. Due to the critical character of the test and the probabilities concerned in sample only a part of a batch, it is only probable to say that no contaminating microorganism have been found in the sample examined in the situation of the test. In other terms it is impossible to show sterility since sampling may fail to select nonsterile containers and culture techniques have limited sensitivity. ⁽⁸⁾

General steps involved in parenteral preparations:-



STERILIZATION PROCESS:-

Sterilization is those process by which all viable microbes are removed or killed, based on a probability function. Sterilization is the removal of all contaminating agents from a surface, a piece of apparatus, food or biological culture medium. This is various from disinfections, where only microorganisms that can cause disease are removed by a disinfectant. In generally any instruments which enter an already sterile part of the body must be sterilized. This includes equipment such as scalpels, hypodermic needles. Autoclaving is the most important method of sterilization. While there are some plastics devise that could not remain dimensionally steady under autoclave temperature are sterilized by other method like gas sterilized or by radiation sterilization.

Various methods of sterilization:-

1. Autoclave sterilization:- usually to sterilize by autoclave a pressurized steam autoclave operates at 121°C for at least 15 min.

2. Radiation sterilization:- This method is very important for medical devices. That can withstand the attack of gamma rays bombardment. Radiation sterilization is only useful for the polymers which are sensitive to heat moisture or ethylene oxide.

3. Gas sterilization:- Ethylene oxide is generally used as sterilant. It is nontoxic to most plastics. Ethylene oxide sterilization is used for most of the plastic syringe and needles.

Types of Parenteral Devices:

- **Syringe:-** Examples: - medical syringe, insulin syringe, disposable syringe & tuberculin syringe.
- **Needle:-** Examples: - hypodermic needles, winged needles.
- **Cannular:-** Examples:- Intravenous (IV) cannulation & Nasal cannulation.
- **Catheter:-** Examples:- Arterial catheter, Balloon catheter, Cardiac catheterization, Central venous catheter, Dialysis.
- **Feeding Tube.** Examples:- nasogastric & gastric feeding tube.
- **Stents.** Examples: - drug-eluting stents. ⁽¹⁰⁾

Parenteral therapy is used to:-

- create a localized effect.
- The oral route cannot be used for drug administration.
- Easy administration of drugs to the unconscious patient.
- Quickly accurate fluid and electrolyte imbalance.
- Accurate delivery of the drug to the target tissues. ⁽¹¹⁾

Filling and sealing control of parenteral products:-

GMP practices need that in method quality assurance testing be effectively intended during all stages of manufacturing that number of samples have for testing and the type of testing are evidently dependent upon the batch size and the type of parenteral product. If the difference from particular limits occurs the essential corrective action is taken and recorded and a resample is taken and tested to find out whether the quality characteristic of the parenteral product is now inside limits in some instances as in the case of volume examination if the deviation is too much all injectables produced prior to the corrective action should be isolated accounted for and rejected. ⁽¹²⁾

CONCLUSION

It was concluded that parenteral route of administration is the most effective route for the delivery of the active pharmaceutical substances with narrow therapeutic index, poor bioavailability especially for those drugs, prescribed to unconscious patients. The present article describes that route of administration, types of parenteral products, advantages, test for sterility, steps for preparation of parenteral, sterilization, filling and sealing of parenterals. It is more significant to produce good quality of parenteral. Parenterals are the pyrogen free liquids these are manufactured and stored according to GMP guidelines. Proper area environmental control, personnel observation will give excellent parenteral products and attain their described therapeutic effect.

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