INTRODUCTION

Dental diseases are among the most widespread chronic disorders affecting mankind. In recent years periodontal disease is seen as a health problem of worldwide magnitude.

Introduction of Periodontal diseases:

Periodontal (gum) diseases, including gingivitis and periodontitis, are serious infections that, left untreated, can lead to tooth loss. The word periodontal literally means "around the tooth". Periodontal disease is a chronic bacterial infection that affects the gums and bone supporting the teeth. Periodontal disease can affect one tooth or many teeth. It begins when the bacteria in plaque (the sticky, colorless film that constantly forms on your teeth) causes the gums to become inflamed.

✓ Gingivitis

Gingivitis is the mildest form of periodontal disease. It causes the gums to become red, swollen, and bleed easily. There is usually little or no discomfort at this stage. Gingivitis is often caused by inadequate oral hygiene. Gingivitis is reversible with professional treatment and good oral home care.

✓ Periodontitis

Untreated gingivitis can advance to periodontitis. With time, plaque can spread and grow below the gum line. Toxins produced by the bacteria in plaque irritate the gums. The toxins stimulate a chronic inflammatory response in which the body in essence turns on itself, and the tissues and bone that support the teeth are broken down and destroyed. Gums separate from the teeth, forming pockets (spaces between the teeth and gums) that become infected. As the disease progresses, the pockets deepen and more gum tissue and bone are destroyed. Often, this destructive process has very mild symptoms. Eventually, teeth can become loose and may have to be removed.

There are many forms of periodontitis. The most common ones include the following.

✓ Aggressive periodontitis

✓ Chronic periodontitis
Periodontitis as a manifestation of systemic diseases

Necrotizing periodontal disease

Treatment of periodontal diseases:

The addition of a chemotherapeutic agent should effectively eliminate the bacteria at the bottom of deeper pockets or in dentine tubules and not removed with mechanical treatment. This should do greater clinical improvement in more advanced disease than scaling and root planning alone. The clinical efficacy of systemic antibiotic therapy is well established; it is important to note that, systemic therapy dilutes the antimicrobial agents several thousand fold before reaches the disease site. Therefore large doses and prolonged administration is often necessary to maintain an effective drug concentration at the site. Repeated long-term use of systemic antibiotics is also associated with potential adverse effects like gastrointestinal disorders, development of bacterial resistance and superimposed infections patient non-compliance etc. The increased toxic side effects at higher dose levels make systemic administration unacceptable due to low benefit to risk ratio. A better, safer and effective low dose drug delivery is highly desirable.

The effective use of antimicrobial agents for the treatment of periodontal diseases requires an adequate drug concentration at the site of action. The use of topical antimicrobial agent for treatment of periodontitis is generally preferred as it allows direct access of high local concentration of antimicrobial agents. Many antimicrobial agents have been tried as mouth rinses in the control of periodontal disease with poor to moderate degree of success, except chlorohexidine that has proved to be dependable in reducing gingivitis and plaque formation and accumulation.

Local drug delivery systems:

Local antibiotics therapy offers several advantages over systemic therapy. These systems are site specific. This involves direct placement of antibacterial agents(s) into sub-gingival sites, minimizing the impact of the agents on non-oral body sites. The local delivery of an antibiotic can accomplish higher therapeutic concentrations in the sub-gingival sites than those possible with systemic therapy of antibacterial agents. Local antimicrobial therapy in periodontitis involves direct placement of an antimicrobial agents into sub-gingival sites, minimizing the impact of the agents on
non-oral body sites. Local antimicrobial agents may be personally applied as a part of home care oral hygiene regimens or professionally applied as part of clinic based treatment procedures. Local antimicrobial therapy in periodontitis may be classified as sustained sub-gingival drug delivery; non-sustained sub-gingival drug delivery provides high concentrations of the antimicrobial agents for only short time periods.

Localized (semisolid) drug delivery system used in pharmaceuticals includes the ointments, pastes, creams and gels etc. In conventional mode of drug administration, many drugs do not reach at the target site in the body in sufficient concentration because most of the drugs are prematurely inactivated and excreted. Over the last decade hydrogels formed from natural, semi synthetic and synthetic polymers have been confirmed as vehicles for different types of pharmaceutical applications. They have good viscosity, satisfactory bioadhesives, and are without irritating or sensitizing actions.

**TYPES OF DIFFERENT SEMI SOLID FORMULATIONS**

- **Creams**: Creams are defined as a semisolid dosage forms containing one or more drug substances dissolved or dispersed in a suitable base. Creams are a viscous liquid or semisolid emulsion that is mixtures of oil and water. They are divided into two types: oil-in-water (O/W) creams which are composed of small droplets of oil dispersed in a continuous phase, and water-in-oil (W/O) creams which are composed of small droplets of water dispersed in a continuous oily phase.

- **Ointments**: Ointments are semisolid preparations intended to adhere the skin or certain mucous membranes; these are usually solution or dispersion of one or more medicaments in non-aqueous bases. Ointments bases are often anhydrous and include fats, oils and waxes of animal, vegetable or mineral origin; non-oleaginous and synthetic substances are also incorporated in bases. Ointments are used as vehicle for medicaments intended to produce pharmacological effects at, or near, the application site; they are also applied as emollients and skin protective.
SYNOPSIS

✓ Pastes:\n
Pastes are semisolid dosage form that contains one or more drug substance intended for topical application. Pastes are less greasy than ointments because the powder absorbs some of the fluid hydrocarbon.

They are used as absorbents, antiseptics, protective, or to soothe broken surfaces; they are often applied thickly on dressings rather than spread on the skin. Pastes usually consist of high percentage of insoluble powders (at concentration of 20% to 60%). The stiffness of pastes, they remain in place after application and are effectively employed to absorb serous secretions. Because of their stiffness and impenetrability, pastes are not suitable for application to hairy parts of the body. Basic materials that have been used in the preparation of pastes include soft and liquid paraffin, glycerol, mucilage, and emulsifying waxes and ointments.

A dental Paste is intended for adhesion to mucous membrane for local effect. Dental pastes are basically divided into two kinds of dental paste formulations i.e. therapeutic and cosmetic. Therapeutic is defined by American Heritage Dictionary as the “Medical treatment of disease” and Oxford Dictionary as “Curative”. Therapeutic dental paste is a drug-containing active ingredient, which tested by clinical trials for cure of specific oral disease and generally prescribed by doctor.

✓ Gels:\n
According to the “Encyclopedia of polymer science and engineering”: a gel is a cross-linked polymer network swollen in a liquid medium. Its properties depend strongly on the interaction of these two components”. According to its phenomenological characteristics a gel is better defined as a soft, solid or solid-like material consisting of two or more components, one of which is a liquid, present in substantial quantity.

Gels are often non greasy and are generally applied externally. The term ‘gel’ has also been applied in pharmacy to some viscous suspension for oral use (e.g., aluminum hydroxide gel). As well as being used as delivery vehicles for local anesthetics, spermicides, and dermatological agents, a gel are used for lubrication of gloves and for instruments, as film-formers in patch testing, and for conductivity enhancement on the terminals of electrocardiograph leads. Gels used as lubricants for catheters or devices inserted into internal organs are required to be sterile.