**Epidemiology**

**Epidemiology**  **Dr.Huda Jasim Jebur**

The term epidemiology is of Hellenic origin; it consists of the preposition “epi”, which means “among” or “against”, and the noun “demos”, which means “people”. Epidemiology is defined as the study of the distribution of disease or a physiological condition in human populations and of the factors that influence this distribution. The ultimate goal of epidemiological studies is to determine evidence-driven preventive and therapeutic strategies.

**The epidemiologic research in periodontology must have the following requirements:**

1- Provide data on the prevalence of periodontal diseases (the frequency of their occurrence) in different populations, as well as its severity.

2- Elucidate aspects related to the etiology and the determinants of these diseases (causative and risk factors).

3- Provide documentation concerning the effectiveness of preventive and therapeutic measures on a population basis.

**Epidemiologic measures of disease:**

•**Incidence** is defined as the rate of occurrence of new disease in population during given period of time

•**Prevalence** is defined as the proportion of persons affected by the disease at specific point in time such as cross-sectional survey

**Epidemiologic Study Designs**

Epidemiologic study designs fall within two broad categories:

1- Observational studies such as case–control, cross-sectional and cohort studies.

2- Interventional studies such as clinical controlled trials (randomized and nonrandomized).

**Epidemiologic studies**

**1. Randomized Controlled Trials**

Randomized controlled trials in periodontics typically assign patients randomly to a treatment and non-treatment groups. Patients are then monitored, and subsequent outcomes are assessed.

**2. Cross-sectional studies**

In Cross-sectional studies, the presence or absence of disease and the characteristics of the members of a population are measured at a point in time.

**3. Cohort Studies**

Cohort studies can also be referred to as exposure-based study designs. Subjects who are free of the disease of interest are classified with respect to an exposure (e.g., cigarette smoking, diabetes). Those subjects are followed longitudinally for the assessment of periodontal outcomes.

**4. Case–Control Studies**

Case–control studies are typically referred to as outcome-based study designs. Persons with an outcome (condition) of interest (i.e., cases) are compared with persons without a condition of interest (i.e., controls) with respect to the history of the suspected causal factors (exposure). For example, if an individual suffers from food poisoning (outcome) after a party, he or she is likely to compare his or her past food intake (exposure) with those individuals who did not experience food poisoning. The primary goal of a case–control study is to find out what past exposures or factors are different between patients with a disease versus those without the disease.

**Definition of an index**

periodontal index as "A numerical value describing the relative status of the population on a graduated scale with definite upper and lower limits which is designed to permit and facilitate comparison with other population classified with the same criteria and the method".

**Ideal Requisites of an Index**

**1. Reliability**: Index should be measured consistently at different time and under varied conditions.

**2. Validity:** It must measure what it is intended to measure, so it should correspond with actual clinical stage of the disease.

**3. Quantifiability:** Should be a meanable to statistical analysis.

**4. Sensitivity:** The index should be able to detect reasonably small shift of the condition.

**5. Clarity, Simplicity and objectivity:** The examiner should be able to remember the criteria easily, easily to apply and the criteria should be clear.

**6. Acceptability:** The use of index should not be painful and embarrassing to the subject.

**7. Practicality:** Use of the technique should be practical in particular circumstances of the survey.

**Periodontal Indices**

**1-Assessment of dental plaque**

An index scores plaque deposits **(Plaque Index System)** on a scale from 0 to 3 (Silness & Loe 1964):

**0** No plaque.

**1**  Plaque can be recognized by running probe across the tooth surface.

**2** Visible plaque.

**3** Abundance of plaque.

**2-Assessment of inflammation of the periodontal tissues**

Presence of inflammation in the gingiva is usually recorded by the use of a probe, and often according to the principles of the **Gingival Index System** outlined by Loe and silness (1963). According to this system,

**0** Normal gingiva.

**1** Slight change in color, edema and no bleeding on probing.

**2** Redness, edema and bleeding on probing.

**3** Marked redness and edema, ulceration, tendency to spontaneous bleeding.

Bleeding after probing to the base of the probable pocket (**Gingival Sulcus Bleeding Index**) has been a common way of establishing the occurrence of subgingival inflammation, characterized by the presence of an inflammatory infiltrate adjacent to the ulcerated pocket epithelium.

**0** No bleeding occurs after probing.

**1** Bleeding emerges within 15 seconds after probing.

**3-Assessment of loss of periodontal tissue support**

One of the early indices providing indirect information on the loss of periodontal tissue support was the **Periodontal Index (PI)** developed in the 1950s by Russell (1956), and until the 1980s it was the most widely used index in epidemiologic studies of periodontal disease. Its criteria are as:

**0** Tooth with healthy Periodontium.

**1** Tooth with gingivitis around only part of the tooth circumference.

**2** Tooth with gingivitis encircling the tooth.

**6**  Pocket formation.

**8** Loss of function due to excessive tooth mobility

**Periodontal Disease Index (PDI)**, developed by Ramfjord (1959), is a system designed to assess destructive disease; it measures loss of attachment instead of pocket depth and is, therefore, an irreversible index.

The scores ranged from 0→6 include periodontal health or gingivitis (score 0→3) and various level of attachment loss (score 4→6).

Score

**0** No inflammation, no alterations in the gingiva

**Gingiva**

**1** Mild to moderate gingivitis at some locations on the gingival margin

**2** Mild to moderate gingivitis of the entire gingival margin surrounding the tooth

**3** Advanced gingivitis with severe erythema, hemorrhage, ulceration

**Periodontium**

**4** Up to 3 mm of attachment loss, measured from the cementoenamel junction

**5** 3-6 mm of attachment loss

**6** More than 6 mm of attachment loss

The PDI contains a gingivitis index in scores 1, 2 and 3, and a measure of attachment loss independent of gingivitis, in scores 4, 5 and 6. The PDI is not indicated for private practice but for epidemiologic studies.

The number of probing assessments per tooth has varied in epidemiologic studies from two to six, while the examination may include either all teeth present (full‐mouth) or a subset of Ramfjord index teeth (partial-mouth examination).

**4-Radiographic assessment of alveolar bone loss**

Radiographic assessment of alveolar bone loss includes:

* Presence of an intact lamina dura.
* The width of the periodontal ligament space.
* The morphology of the bone crest.
* The distance between the cemento-enamel junction and the most coronal level of alveolar bone crest.

**5- Assessment of marginal gingival recession**

Miller in 1985 proposed four classes of marginal tissue recessions which are based on the level of gingival margin with respect to the mucogingival junction (MGJ) and the underlying alveolar bone.

**Class I:** Marginal tissue recession not extending to the MGJ. No loss of interdental bone or soft tissue.

**Class II:** Marginal recession extending to or beyond the MGJ. No loss of interdental bone or soft tissue.

**Class III:** Marginal tissue recession extends to or beyond the MGJ. Loss of interdental bone or soft tissue is apical to the cementoenamel junction (CEJ) but coronal to the apical extent of the marginal tissue recession.

**Class IV:** Marginal tissue recession extends to or beyond the MGJ. Loss of interdental bone extends to a level apical to the extent of the marginal tissue recession

**6-Assessment of periodontal treatment needs**

An index system aimed at assessing the need for periodontal treatment in large population groups was developed. The principles of the Community Periodontal Index for Treatment Needs (CPITN) can be summarized as follows:

1. The dentition is divided into six sextants (one anterior and two posterior tooth regions in each dental arch). The treatment need in a sextant is recorded when two or more teeth not intended for extraction are present. If only one tooth remains in the sextant, the tooth is included in the adjoining sextant.

2. Probing assessments are performed either around all teeth in a sextant or around certain index teeth (only the most severe measure in the sextant is chosen to represent the sextant; recommended for epidemiologic surveys).

3. The periodontal conditions are scored as follows:

**Code 0** is given to a sextant with no pockets, calculus or overhangs of fillings and no bleeding on probing

**Code 1** is given to a sextant with no pockets, calculus or overhangs of fillings, but in which bleeding occurs after gentle probing in one or several gingival units

**Code 2** is assigned to a sextant if there are no teeth with pockets exceeding 3 mm, but in which dental calculus and plaque‐retaining factors are identified subgingivally

**Code 3** is given to a sextant that harbors teeth with 4–5‐mm deep pockets

**Code 4** is given to a sextant that harbors teeth with pockets that are 6 mm deep or deeper.

4. The treatment needs (TNs) scores range from 0 to 4 and are based on the most severe periodontal condition code in the entire dentition, recorded as above. Thus,

**TN 0** indicates no need for periodontal therapy in the presence of gingival health (Code 0),

**TN 1** need for improved oral hygiene (Code 1);

**TN 2** need for scaling, removal of overhangs, and improved oral hygiene (Codes 2 + 3);

**TN 3** more advanced treatment needs (Code 4).

The examination is performed with a special probe, It is CPI probe with 0.5 mm ball tip with black band between 3.5 mm and 5.5 mm and ring at 8.5 mm and 11.5 mm from the ball tip for measurement of loss of attachment.

**Calibration (Alignment and assessment)**

Calibration must be carried out to record measurements in order to obtain reliable and valid measurements.

**1. Intra examiner calibration:** means that the same patient is examined by the same examiner for the same condition at different time points.

**2. Inter examiner calibration:** the same patient is examined for the same condition by different examiners.

**Prevalence of Gingivitis and Periodontitis**

Gingivitis has been observed in children younger than five years of age. In general, the prevalence and severity of gingivitis increased with age, beginning at approximately five years of age reaching their highest point in puberty and then very gradually decreased but remaining relatively high throughout life but the highest prevalence of the gingivitis occurred during puberty (the prevalence of gingivitis in age (18-20) is about 42%).

Periodontal disease increased in prevalence and severity with increasing age. The increase may be result of accumulative effect of episodes of periodontal destruction or a gradual increase of severity of destruction caused either by deterioration of oral cleanliness or by change in host response and/or plaque composition with increase age. In Iraq, the prevalence of periodontitis is 40%.

(See good in all things)

Thank you