EPIDEMIOLOGY OF PERIODONTAL DISEASES

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History

- Epidemiology has its origin in the idea, first expressed over 2000 yrs ago by Hippocrates & others.

- This scientific method which was lost after death of Hippocrates was revived by CLAUDIUS GALEN (130-200A.D.), a Greek.

- *JOHN SNOW* is considered as 'father of epidemiology' because of his findings on epidemic of cholera in London in 1854.

- The term epidemiology is derived from Greek word, *EPIDEMIC :*

  Epi = upon

  Demos = people

  Logos = science

The term “Epidemiology” is applied to the broader field of study involving consideration of many predisposing factor to the disease as well as the apparent cause with the frequency of the disease in the group.

Definition

- Epidemiology is the study of distribution and determinants of health-related states or events in specified populations, and the application of this study to the control health problems.

Principles of epidemiology

- Exact observation
- Correct interpretation
- Rationale explanation
- Scientific construction

Purpose Of Epidemiological Study

1. To determine the amount and distribution of a disease in a population.
2. To investigate causes for the disease.
3. To apply this knowledge to the control of the disease.

COMPONENTS

- **The epidemiological triad**
  - The agent
  - The host
  - The environment

- **The tools of epidemiology**
  - Ratio
  - Proportion

Epidemiological Triad

- AGENT:
  - Plaque
  - Calculus
  - Bacteria

Epidemiological Triad

- HOST:
  - Age
  - Gender
  - Endocrine Changes
  - Iatrogenic factors
  - Habits

Epidemiological Triad

- ENVIRONMENT:
  - Geographic Areas
  - Nutrition

Epidemiologic Measures of Disease

Prevalence:

- Prevalence is the proportion of persons in a population who have the disease of interest at a given point or period of time.
- Prevalence = $\frac{\text{no of persons with the disease}}{\text{no of persons in the population}} \times 1000$
- It is a measure of the burden of disease in a population.

USE

1. To estimate the magnitude of disease or health problems in community.
2. To identify the potential high risk population.
3. Useful in administrative & planning purposes like, assessing manpower needs in health services, delivery of health services etc.

Limitations of prevalence rates:

- It is not the ideal measure for studying etiology of disease.

Types of prevalence:

- Point prevalence

Definition: 'the no. of all current cases (both old & new) of a specific disease at one point in time in relation to a defined population'.

'a point in time' can be either a day, few days or even few weeks depending upon the time taken to examine the sample of population.

- Period prevalence

Definition: 'the total no. of existing cases (old &new) of a specific disease during a defined period of time.

- It is the sum of the point prevalence & the incidence.
- Period prevalence are more useful when they are separated into their two components.
- Usually when the term 'prevalence rate' is used, it refers to 'point prevalence'.

Incidence

- Definition: Incidence is average percentage of unaffected persons who will develop the disease of interest during a given period of time.

- Incidence = $\frac{\text{no. of new case}}{\text{no. of persons at risk}}$ x1000

Uses of incidence rates:

- It helps in taking action to control the disease.
- It gives clues to research into the etiology & pathogenesis of disease.
- It helps with the study of distribution of disease.
- It is useful in evaluating the efficacy of preventive & therapeutic measures.

Epidemiological methods

1. Descriptive epidemiology
2. Analytical epidemiology
3. Experimental epidemiology

METHODS FOR SAMPLING SUBJECTS

Simple random sampling

Systemic random sampling

Stratified random sampling

Cluster sampling

DESCRIPTIVE EPIDEMIOLOGY

- Carried out to monitor disease trends in a population.
- Results can be used to plan or evaluate programs and policies for disease control, dentist and auxiliary development and financing of dental care.
- Descriptive results also can stimulate the development of hypotheses for further analytical studies in epidemiological, clinical or laboratory research.

ANALYTICAL STUDIES

- Designed to examine the correlates of diseases, and measures the effects of exposure to known or hypothesized risk factors on disease outcome.
- Analytical studies test hypotheses by measuring the strength of association between a group's disease experience with host factors, environmental exposures or behavioral variables.
- There are 3 types of analytical study: cross-sectional, cohort and case-control.

CROSS SECTIONAL STUDIES

- They are also referred prevalence studies.

- In cross sectional studies the presence and absence of disease and the characteristics of the member of a population are measured at a point of time.

COHORT STUDIES

- Unlike cross-sectional studies, cohort follows subject for longer period of time.
- The purpose of the cohort study is to determine whether an exposure is associated with development of disease.
- Subjects are classified into exposed and unexposed group and then followed for long period of time.

CASE-CONTROL STUDIES

- Provides an efficient way to investigate the association between an exposure and a disease, especially a rare disease.
- Because case control studies do not follow the subject over a period of time, they require fewer resources and can be conducted more quickly.
- The major disadvantage is the temporal relationship.

	Cross sectional	Case control	Cohort studies
Time	One time point	Retrospective	Prospective
Other name	Prevalence study	Case reference study	Longitudinal Forward looking Incidence study
Incidence	No	No	Allows the study of incidence

	Cross sectional	Case control	Cohort studies
Prevalence	Allows the study of prevalence	No	No
Causality	No	Yes	Yes
Role of disease	Measures disease	Begins disease	Ends with disease

	Cross sectional	Case control	Cohort studies
Assesses	Associated risk factor and disease	Many risk factor for a single disease	Single risk factor for many disease
Data analysis	Chi-square test	Odds ratio	Relative risk
Advantages	-Use to calculate prevalence -Faster	-Quick and inexpensive -Useful for study rare disease -Easy to conduct	-Incidence can be calculated -Provides direct estimation of relative risk

	Cross sectional	Case control	Cohort studies
Disadvantages	-Unusable for acute disease	-Recall bias and selection bias are present -Missed the undiagnosed case	-Expensive -Time consuming -Involves large number of subjects

- Experimental Epidemiology:

The results obtained from observational studies about association & causation/benefit of a particular intervention can be visualized through experimental approach.

1. Randomised controlled trials
2. Field trials
3. Community trials

Periodontal Epidemiology

- It is the study of the pattern (distribution) & dynamics of periodontal diseases in a human population.

- Russell defined it as 'not so much the study of disease as a process as it is study of the condition of the people in whom the disease occurs'.

Difficulties in Periodontal Epidemiology:

- More no. of factors involved.
- Objective measurement of soft tissues changes is difficult.

Objectives

- To increase understanding of disease process.
- Development of methods of control & prevention.
- Discover population at high & low risk.
- To define specific problem under investigation.
- To design, conduct & interpret clinical trials.

History

- Early work was limited to descriptive type of study based on clinical examination of individual.
- Quotes from books of epidemics by Hippocrates:

'the 3rd upper tooth is found to be decayed more frequently than all the others'.

'individuals with long shaped head & strongly arched palates show crowding of teeth..'

Epidemiology of Gingival & Periodontal Diseases

Prevalence of Periodontitis

- Compared with that in South America & in Asian countries, the severity of periodontal disease in United States is relatively low.

Prevalence of juvenile periodontitis

NIDR survey of children in 1989:

Using loss of periodontal attachment to classify adolescents (14-17 yrs), it was found that

- 0.53% LJP
- 0.13% GJP
- 1.61% incidental loss of attachment (at least one tooth with 3mm /more attachment loss)
- Severely affected teeth

  1^{st} molars>2^{nd} molars>incisors

- LJP & GJP: blacks>whites
- GJP: males>females
- LJP: black males> black females
- LJP & GJP incidence: 1.5 cases per 1000 person per year at risk.

…….Loe & Brown in 1991

Periodontal disease & level of oral hygiene

- Chawla(1958) studied relationship between bacterial plaque & periodontal disease.

  800 individuals from Lucknow were examined according to Ramjford's method. Analysis of results showed that although there was some relationship between amount of plaque formation & gingivitis, the coefficient of relationship did not reveal a high positive correlation.

- Loe & Thailade (1965) studied relationship between oral cleanliness & periodontal disease:
- When all oral hygiene measures were withdrawn from individuals with healthy gingiva, bacterial plaque accumulations on teeth markedly increased & clinically evident gingivitis appeared in 10-21 days.
- Bacterial counts dropped substantially & gingiva returned to health a few days after oral hygiene procedures were returned.

Prevalence of periodontitis among Indians

- Marshall Day & Shourie : 1949
  - Study on 568 people from 9-60 years reported periodontitis in about 35% of cases.
- Belting, Massler & Sehram; 1953
  - 2% of cases they examined upto 30 yrs of age were affected by periodontitis.
  - 22% in 40-50 yrs of age group, after this age, prevalence declined.

- Tewari & S.S. Rao ;
  - Studied 1200 Indian patients & noted 6.83% cases with periodontitis.
  - Individuals affected with periodontitis belonged to middle & lower income families from western & northern parts of country.

- Ramjford ;1961

  boys in rural & urban areas of bombay

  urban-1161 samples

  - 11-17 age group
  - 100% gingivitis
  - 2.2% bone resorption

  rural- 159 samples

  - 19-30 age group
  - 100% gingivitis
  - 42.4% bone resorption

Prevalence of Gingivitis

- Prevalence & severity of gingivitis increase with age beginning at approx. 5yrs of age, reaching highest point in puberty & then gradually decreasing but remaining high throughout life.

Prevalence of Gingivitis

- Marshall-Day & Tondon; 1940
  -survey conducted on middle class children in lahore
  - 756 children
  - age group approx. 13 yrs
  - 68% affected with gingivitis

- Marshall Day & Shourie; 1947
  girls of high socioeconomic level in Lahore
  - 179 girls, 9-17 yrs of age
  - 73.3% gingivitis

- THANK YOU ...