Concepts of Disease and Disease Causation

What is disease?

- An adequate definition of disease is yet to be found.
- Dictionary defines disease as a condition which health is impaired ….

- **There have been many attempts to define disease:**
- A condition in which body health is impaired.
- A change from state of health.
- An alteration of the human body interrupting the performance of vital functions.
- A condition of the body or some part or organ of the body in which its functions are disrupted or deranged.

- Ecological definition:
- Disease is defined as maladjustment of the human organism to the environment.
- Sociological definition:
- Disease is considered as a social phenomenon occurring in all societies and defined and fought in the particular cultural forces prevalent in the society.

- The simplest definition is just disease is opposite to health:
- These definitions are considered in adequate because they do not give criterion by which to decide when a disease state begin nor do they lend them selves to measurement of disease.

- WHO has defined health but not disease because disease has many shades ranging from apparent {sub clinical cases to severe manifest illness, some disease commence acutely (e.g. food poisoning), and some insidiously (e.g. mental illness) some diseases has a carrier state e.g. (typhoid fever)}.

- Some organisms may cause more than one clinical manifestations e.g. (streptococcus).

Some diseases caused by more than one organism e.g. (Diarrhea). Some diseases has a short course, some has along course.

- In many diseases the border between normal and abnormal is indistinct e.g. in diabetes, hypertension, mental illness.
  - The end point of the disease is variable, recovery, disability or death of the host.

- Distinction between the 3 words. Illness, disease, sickness.
- **Disease: is a physiological, psychological dysfunction:**
- **Illness:** is a subjective state of a person who feels aware of not being well.
- **Sickness:** is state of social dysfunction (i.e. a role that individual assumes when ill).

CONCEPTS OF CAUSATION:

- Germ theory of Disease.
- Epidemiological triad.
- Multifactoral causation.
- Web of causation.

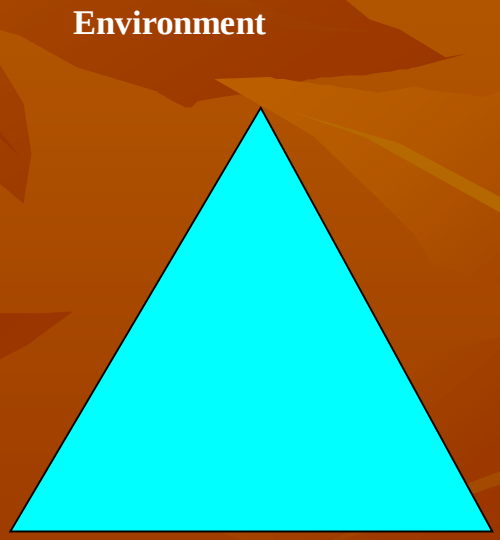
CONCEPTS OF CAUSATION:

- **Germ theory of the disease:**
- This concept gained momentum during 19th and the early part of 20th century.
- The concept of cause in germ theory of disease is generally referred to a one to one relationship between causal agent and disease.

- Disease agent → Man → Disease
- The gem theory led the epidemiologist to take one sided view of disease causation.
- It is now recognized that a disease is rarely caused by a single agent alone but depend a number of factors.

- **Epidemiological triad:**
- There are factors relating to the host and environment which are equally important to determine whether or not disease will occur in the exposed host.

Epidemiological triad



- **Multifactorial causation:**
- The concept that the disease is due to multiple factor is an early one.

The realization began to down that the single cause idea was simplified and that there are other factors in the etiology of the diseases – social – economic – cultural – genetic and psychological where equally important. e.g.

- tuberculosis is not merely due to tubercle bacilli factors such as poverty, over crowding and malnutrition, so germ theory is shown to be unsuitable even for microbial diseases e.g. tuberculosis, leprosy.

- Diseases such as coronary heart disease and cancers are due to multiple factors e.g. excess in fat in take smacking, lack of physical exercise and obesity.

- Most of these factors are equally important and also linked to life style and human behavior the multifactorial concept offers multiple approaches for the prevention and control of disease.

- **Web of causation:**
- This model is ideally suited in the study of chronic disease, where the disease agent is often not known, but it is the out come of interaction of multiple factors.
- The web causation considers all the predisposing factors of any type and their interrelationship with each other.

- The causal web provides a model which shows a variety of possible interventions that could be taken (e.g. in myocardial infarction).

Thank you

Natural History of the disease

- The natural history of the disease is a key concept in epidemiology, it signifies the way in which a disease evolves over time from earliest stage to its termination as recovery disability or death.
- The way which disease evolves over time from the earliest stage to its terminations as recovery, disability or death, in the absence of treatment or prevention

Natural History disease (in infectious disease)

- **It consists of two phases:**
- Pre pathogenesis (i.e. the process in the environment).
- Pathogenesis (the process in man.)
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- **(1) Pre pathogenesis:**
- This is refer to the period preliminary to the onset of the disease, the disease agent has not yet entered the man,.

but the factors favors its interaction with human host are already existing in the environment

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- **This situation is referred to as (man in the midst of disease) or man exposed to the risk of the disease**

- The causative factors of the disease classified as AGENT, HOST and ENVIRONMEVT, these three factors refers to as epidemiological triad, the presence of these factors in the pathogenesis period is not sufficient to start disease in man what is required is an interaction of these three factors to initiate the disease process in man.

- The agent, host and environment operating in combination determine not only the onset of disease but also the distribution of the disease.

Agent factors

- **Agent factors:**
- The first chain in disease transmission is the disease agent:
- The disease agent defined as a substance living or non-living, the excessive presence or relative tack of which may initiate or perpetuate a disease process.

- The disease may have a single agent, a number of independent alternative agents.

Classification of disease agents

- Biological (infectivity, pathogenecity, virulence).
- Nutrients.
- Physical.
- Chemical.
- Mechanical.
- Social.
- Absence or insufficiency or excess of a factor necessary to health.

- **1-Biological agents:**
- These are living agents of disease (viruses rickettsiae, Fungi, Bacteria, Protozoa).
- **These agents exhibit certain host related properties:**
- **a-Infectivity:**
- The ability of the infectious agent to invade and multiply in the host.

- **b-Pathogenesity:**
- The ability to induce clinical apparent illness.
- **c-Virulence:**
- This is defined as proportion of clinical case resulting in severe clinical manifestation (case fatality rate)

- **2-Nutrient agents:**
- Any excess or deficiency of the intake of nutritive element (proteins, carbohydrates, water, vitamins, minerals … etc) may result in nutritional disorder e.g. protein energy mal nutrition, anemia, obesity and vitamin deficiency.

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- **4-Chemical agents:**
- Endogenous chemical produced inside the body as a result of derangement of function e.g. urea, (ureamia), serum bilirubin (jaundice).
- **(5) Social agents:**
- These are poverty, smoking, abuse of drugs and alcohol, unhealthy lifestyles, social isolation.

- **6-Absence or insufficiency or excess of a factor necessary to health:**
- insulin, immunological factors → agammaglobulinaemia.
- **2- Host factors:**
- Host factors play a major role in determining the outcome of an individual exposure to infection (e.g. Tuberculosis).

- **Host factors classified into:**
  - Demographic characteristic e.g. age, sex, ethnicity.
  - Biological characteristic: such as genetic factors biological level of the blood (e.g. cholesterol).
  - Social and economic characteristic: such as social economic status, education, occupation, stress.
  - Life style: such as living habits, nutrition, physical exercise.

- **3-Environmental factors: (extrinsic)**
- These include all the man's external surroundings such as air, water, food, housing, etc.
- The environment of man has been divided into three components, physical, biological and psychosocial.

- **(a) Physical environment:**
- This term applied to none living thing e.g. water, air, trend, housing, soil with which the man is in constant interaction.

- **(b) Biological environment:**
- Is the universe of living things which surrounds man including man himself, the living things are viruses and other microbial agents insects, rodent animal and plants. They are constantly working for their survival and in this process, some acts as a reservoir of the disease, disease producing agents, intermediate host.

- **(c) Psychosocial environment:**
- It is difficult to define psychosocial environment, it includes a complex of psychosocial factors which are defined as those factors affecting personal health they include cultural values, customs beliefs, religion, education, lifestyle, health services, social and political organization. Social environment has both positive and negative aspect on the health of the individual, and communities.

- **(2) The pathogenesis phase:**
- The pathogenesis phase begins with the entry of the disease (agent) in the susceptible human host.
- The events in the pathogenesis phase are:
  - The disease multiplies and induces tissue and physiological changes.

- The disease progresses through a period of incubation and later through early and late pathogenesis.
- The final out come of the disease may be recovery disability or death.

- The pathogenesis phase may be modified by intervention measures such as immunization and chemotherapy.

Risk factors:

- For many disease the agent is still unidentified, e.g. heart disease.
- Where the disease agent is not firmly established the etiology is generally discussed in terms of risk factors.
- The at risk approach is used for increasing the efficiency of health services within the limits of existing resources.

- **Risk factors:**
- **Has 2 meaning:**
  - An attribute or exposure that is significantly associated with the development of a disease.
  - A determinate that can be modified by intervention there by reducing the possibility of occurrence of disease.

- **Classification of risk factors:**
- Causative e.g. smocking for lung cancer.
- Contributory, (e.g. lack of physical exercise for coronary heart disease).
- Predictive, (e.g. illiteracy for maternal mortality).

Major Risk Factors:

A risk factor is any attribute, characteristic of exposee an individual which increases the like hood of overping in disease:

- Smoking.
- Alcohol abuse.
- Life style patterns (dietary, habits, physical, activity).
- Obesity.
- Environments factors (pollution, occupation, nature carcinogens…).
- Stress factors.
- Failure or inability to obtain preventive health services.
- Physiological risk factor (raised cholesterol).

Types of risk factors

Not modifiable:

- Age
- Sex
- Family history
- Genetic factors
- Personality

Modifiable:

- Smoking
- High blood pressure
- Elevated cholesterol
- Obesity
- Sedentary habits
- Stress

- Some risk factors can be modified e.g. smoking, obesity, they are amenable to intervention.
- Some are not modified include sex, age, family history, genetic factors; they are not subject to change.

- **Risk groups:**
- Another approach developed and promoted by WHO is to identify the risk groups (target group) e.g. (at risk mothers, at risk infants) in the population by certain criteria and direct appropriate action to them first.

Spectrum of Disease

- Geographic representations of variations in the motivation of disease.
- At one end are subclinical infections.
- At one other end is fatal illnesses.
- In the middle lie illnesses ranging in severity from mild to severe.

Spectrum of disease:

1. Subclinical infection.
2. Mild illness.
3. Severe illness.
4. Fatal illness.

Iceberg of Disease

- The floating of the iceberg represent what the physician sees in the community (clinical cases).
- The vast submerged portion of it represents the hidden mass of the disease (latent pre symptomatic, undiagnosed cases and carriers.
- The waterline represents the demarcation between apparent and in apparent disease.

The Iceberg of Disease

Symptomatic disease

Clinical cases

What is the

physician

sees

……

……

----------Undiagnosed cases and carries----------

What the

Physician ----------

Don’t see ----------

- The vast submerged portion of the iceberg represents the hidden mass of disease i.e latent, in apparent and carriers in the community.
- The water line represents the demarcation between apparent and in apparent disease.

Thank you