

# Do you think disease and disorder are same? –here is the comparative review to brash up your knowledge

**Dr. Shashank Tiwari<sup>1</sup> & Ms. Shreya Talreja\***  
*Director<sup>1</sup> & Lecturer\*, J.P. College of Pharmacy, Lucknow, Uttar Pradesh*

## Abstract

The goal of this review is to deliver the information about Diseases and disorders (DD) and mark sketch line between disease and disorder. In human life, there are many issues or misconceptions between many things like ideas, education, knowledge and yes also one of the disease and disorder, through this review our goal to differentiate to DD for non-medical or in general society/person. Disease is defined as a condition in which the many part, organ, system of the body affects through various causes includes Virus, Bacteria, inflammation, environmental factors, genetic defects etc. it is characterized by certain signs and symptoms to a specific problem with the body, for example tuberculosis, malaria, cancer etc. The term disorder is defined as lack of function of organ or sense of illness that affects the normal physical or mental functions of the body and in other words disorder is also defined as the disruption of the usual body functions. For example Anxiety disorder, Tourette syndrome, Hypertension and any more.

## INTRODUCTION

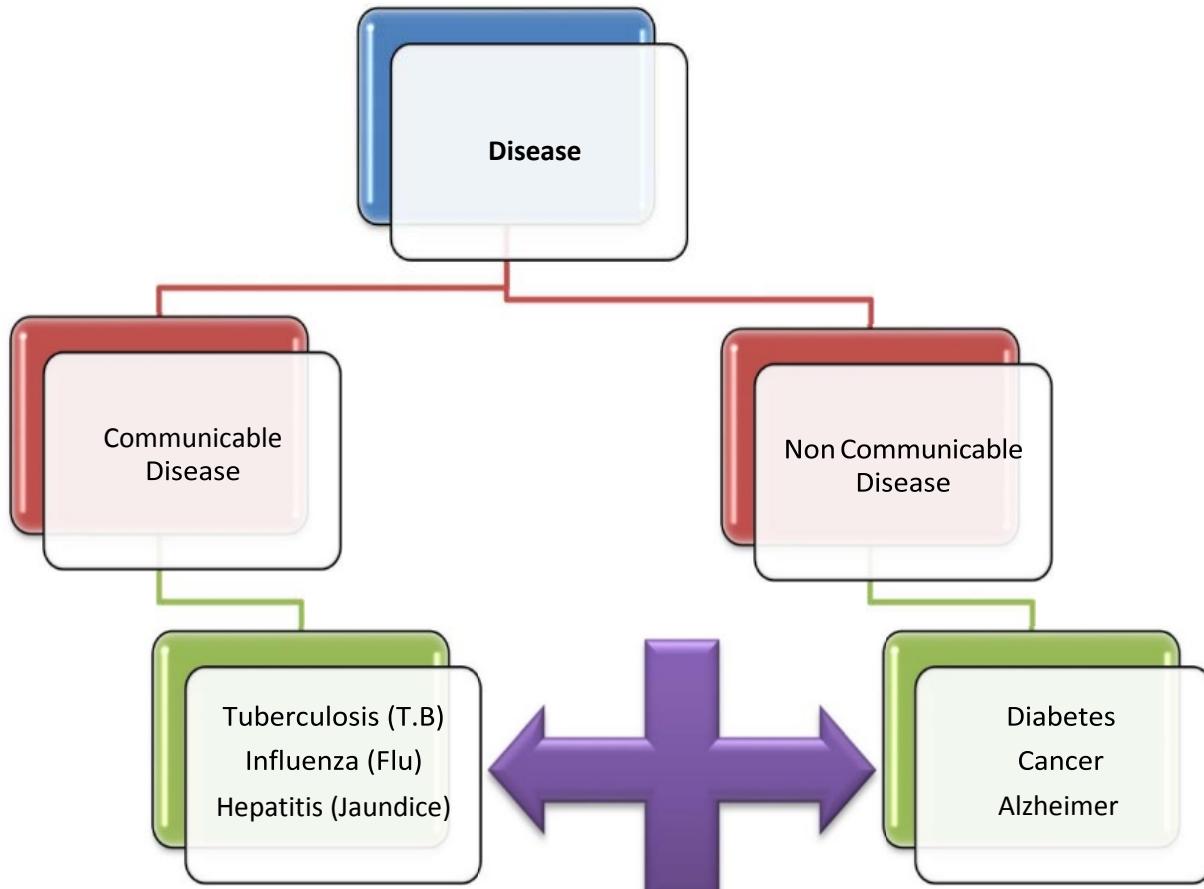
### Disease

The word **disease** is defined as **sense of sickness** (feeling unwell) and it is cured by the advice or treated by the doctors and medical practitioners.

According to **American Medical Association (AMA)** disease is defined as a condition in which the part, organ, system of the body affects resulting from various causes, such as infection, inflammation, environmental factors,

genetic defects. it is characterized by certain signs and symptoms to a specific problem with the body (1,2). For example **cancer** affects the specific organ of the body or may be other body part are affected and one other example such as **paralysis** attack one side of the body but all the organs and functions of the body is affected. In this case the treatment of disease is based on such abnormalities (3).

**Classification of Disease:** - Disease is classified in two parts:-



**Communicable Disease** is a highly infectious disease it is transmitted through one person to another person through air, water, food and caused by germs or pathogens like bacteria, virus, fungi, parasite , worms etc. and the best example of communicable disease is **COVID-19** (4).

Some common **example** of communicable disease such as (5):

- Tuberculosis (T.B)** it is transmitted through air.
- Influenza (Flu)** it is transmitted through air.
- Hepatitis (Jaundice)** it is transmitted through food and water.
- Cholera** is transmitted through food and water.
- Typhoid** its transmitted through food and water.
- Malaria** is transmitted through the bite of mosquito.
- Measles** it is transmitted through air.

**Non communicable Disease (NCD)** is a disease it is not transmitted directly through one person to another person.it is also called as non-contagious disease.

**Example** of non-communicable disease such as (5):-

- **Cancer**
- **Heart disease**
- **Alzheimer**
- **Osteoporosis**
- **Cataracts**
- **Kidney disease**
- **Stroke**

#### **Example of disease**

**Tuberculosis (tb)** is a highly infectious air borne disease. It is a most common example of communicable disease. The causative agent of tuberculosis is mycobacterium tuberculosis (6). The identification of Mycobacterium tuberculosis species done by conventional microscopy (Ziehl-neelsen or Kinyoun stain/cold stain) or fluorescence microscopy (a microscope to examine material that fluoresces under uv light) methods (7). It is the most harmful bacterial infection and sometime disease is very dangerous for patient may be cause a death (6).

Some different/complex species of mycobacterium tuberculosis can cause TB such as (8):

- **Mycobacterium bovis**
- **Mycobacterium canetti**
- **Mycobacterium microti**
- **Mycobacterium africanum**
- **Mycobacterium caprae**
- **Mycobacterium munqui**

#### **Mode of transmission (7, 6)**

1. One person to another person through direct contact/droplet infection (sneezing, cough).
2. Indirect transmission (use of fomites and materials contaminated with infected person/tb patient).
3. Use of Consuming food contaminated with infected person
4. Less chances of transmitted by includes:-Ingestion/

use of infected milk or unpasteurized milk contaminated with mycobacterium bovis species.

5. Trans placental route (it cause a congenital tuberculosis)(6).

**Congenital tuberculosis** is defined as a transmission of disease through infected mother via umbilical cord / ingestion of infected amniotic fluid in to fetus/new born. It is a rare route of transmission of disease (7).

#### **Symptoms of tuberculosis (6)**

Different symptoms of tuberculosis includes:-

- Cough for more than 3 weeks.
- Hemoptysis ( bloody sputum)
- Pain in chest more than 3 weeks.
- shortness of breath
- Amenorrhea
- Arrhythmia
- Hoarseness/dysphonia

Some common other symptoms of tb such as:-

- fever
- Weight loss
- Sweating
- cough
- loss of appetite
- Tiredness

#### **Infected sites/organs (6)**

Some different organs are affected through tb such as:-

1. Pulmonary tuberculosis (85% of all tb cases)
- CNS (loss of appetite, fatigue)
- Lungs( coughing, chest pain)
- Skin (night sweats) etc.
2. Extra pulmonary sites
- CNS (Meningitis)
- lymphatic/lymph node (scrofula in the neck)
- Pleura (Tuberculosis pleurisy)
- Genito urinary ( urogenital tuberculosis)
- Fallopian tubes
- Bones and joint of spine
- Skin
- kidney

#### **Prevention/treatment**

- **Immunization process :- Vaccines** is used for prevention of disease such as **Bacilli calmette Guerin (BCG)** vaccine is used for prevention of tuberculosis in exposed newborn , infants/ children born to mother with suffering from TB and all children should give BCG at birth (9).
- **Drugs/medication:-** certain drugs are useful to prevent and treating tuberculosis includes **isoniazid, rifampicin, pyrazinamide, streptomycin (SM), kanamycin (injectable), Levofloxacin** etc. According to **American academy of pediatrics**

(AAP) these drugs are recommended for patients 9 to 12 months (7). The treatment of tuberculosis is two types:-

- **First line treatment/initial treatment**
- **Second line treatment**

**First-line treatment** is defined as firstly administered the treatment in patient and prevent the tb and some drugs are used in first line treatment and administered the patient these drugs are called as **first line drugs** includes **Isoniazid (INH)**, **Rifampicin**, **Pyrazinamide (PZA)**, and **Ethambutol (EMB)** etc (10).

**Second-line treatment** is defined as this type of treatment is also useful for preventing the tb but these type of treatment is used when first line drug have less or no show effect and difficult to continue and cause some side effect . In these case second line treatment is started and certain drugs are includes in second line treatment these drugs are called as **second line drugs** such as **aminoglycosides**, **fluoroquinolones**, **levofloxacin**, **streptomycin**, **Ethionamide**, **cycloserine**, **p-aminosalicylic acid (PAS)** and **kanamycin** etc (10).

- **Chemoprophylaxis:-** This therapy is useful for preventing the disease. According to AAP this type of preventive therapy is useful and give all infants they suffer from any infectious disease such as tb after birth. Isoniazid drug should be started in case of congenital tb and it is continued for 3 to 4 months and identification of disease by Mantoux test. If mantoux test is negative stop administration of drug after 3 months but if test is positive neonates/children should be diagnosed and treatment of tb is started and drug (isoniazid) is continue for 9 months (7, 11).
- **Isolation:** - Isolation is most common and necessary process of prevent any type of infectious or contagious disease. Isolation is defined as a person is suffering from any contagious disease and provide a separate hygiene condition.

Certain diagnosis test should be done such as respiratory rate, heart rate, body temperature, lymph node size, organomegaly ( abnormal enlargement of organs ), chest test for breath sound, examination of cardiovascular system if pericardial tb, test of central nervous system if CNS tb was diagnosis (7).

#### **Herbal plants Used as a antitubercular drug**

In many years Some different herbal/ natural plants, minerals are used in the treatment of many diseases (12). Natural products have efficacy against some various diseases and it have been selected by humans/researchers many generations of practical experience

Some different herbal medicinal plants are used to treat TB includes (13, 14):-

- ***Acalypha indica*** its common name is **Indian copper leaf/ Indian mercury** and ayurvedic name is Kuppi. Its belonging to the family Euphorbiaceae. The leaves of plant is used as Antibacterial, treatment of bronchitis and asthma (13).
- ***Adhatoda vasica*** its commonly known as **vasa** or **vasaka**. Its belongs to Acanthaceae family. the leaves of vasa is used as in the treatment of bronchial

asthma(13).

- ***Allium sativum (Garlic)***, its ayurvedic name is Lashuna belonging to the family Liliaceae it is used as an antibiotic, fungicide, bacteriostatic, antihelminthic and hypoglycemic agent etc (15).
- ***Aloe Vera*** ayurvedic name is Ghratkumarika its belonging to the family Liliaceae. The leaves and gel of aloe Vera used as a purgative (13).
- ***Ocimum sanctum/tulsi*** belongs to a family Labiate. The leaves, seed and flower of tulsi has many uses and advantage such as antiasthmatic, Carminative ( an agent that prevent or relieves formation of gas/flatulence in the GIT), stomachic, antispasmodic, expectorant and its also have hepatoprotective property (16).
- ***Tinospora cordifolia***, it's also known as **Giloy** and belonging to the family Menispermaceae. Stem and leaves of this plant used as anti-inflammatory, antipyretic etc (17).
- ***Piper species*** belongs to a Piperaceae family.it is used as a carminative and appetizer etc (13).

Not only in India, herbal plants were found in all over world including South Africa, Malaysia, Nigeria, china, Hong Kong, Tibet etc and it is useful in the treatment of many diseases(13). Some **foreign origin plants** are used as a anti tubercular agent such as:-

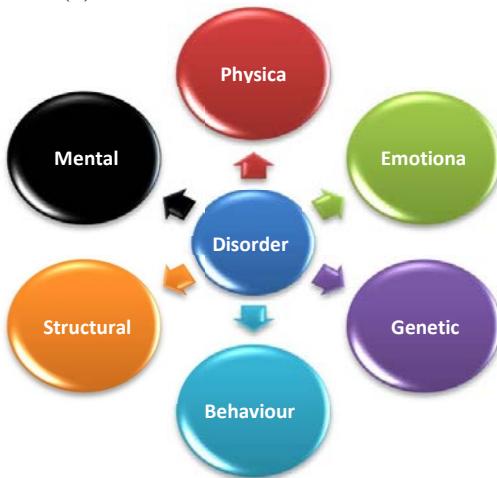
- ***Rhodomyrtus Tomentosa*** it is also known as rose myrtle and belonging to myrtaceae family (18).
- ***Galenia Africana*** it is a south African medicinal plant it possess many different properties includes anti-microbial, anti-fungal and anti-cancer properties etc (19).
- ***Quinchamalium Majus*** is a foreign origin plant and belongs to Santalaceae family. it is used as a anti tubercular drug (20).
- ***Pelargonium reniforme*** is belonging to family Geraniaceae it is used in treatment of dysentery, bronchitis, stomach pain and used to treat severe cough. It's also possess anti tubercular property etc (21).
- ***Helichrysum Melanacme*** it is found in South Africa, Australia and many foreign regions. The ethanolic extract of plant shows antiviral activity and helichrysum species are used to treat many respiratory diseases and it also possess activity against tuberculosis (22).
- ***Evodia elleryana*** plant have many medicinal properties it is useful for the treatment of whooping cough, fever and possess antimicrobial activity and ethyl acetate extract of bark are used for the treatment of tuberculosis (23).
- ***Byrsinima crassa*** belonging to Malpighiaceae family. It is found in Brazil and many foreign region. Methanolic extract of plant leaves is used as a antimicrobial activity (24).

#### **Disorder**

According to **American Psychological Association**

**(APA)** the word **disorder** is defined as **irregularity** or **lack of function of the organ or sense of illness** that affects the normal physical or mental functions of the body and disorder is also defined as the disruption of the usual body functions (25). For example a person is suffering from **headache** that affects lack of function in brain or may be affects any other organ of the body. **epilepsy** is also disorder of the human body because it stops/disrupts the function of the nervous system. All physical disorders/disabilities and mental disorders affects the normal physical and mental functions of the body (26). Generally disorder is cure by doctors, medical practitioner, psychologist or counsellors.

**Types of Disorder:** - Disorder is divided in to different types such as (5) :-



#### Types of Disorder

**Physical disorder** :- Physical disorder which have no diagnosed by laboratory or imaging test or chemical tests it is diagnosed by behavioral syndrome. this type of disorder produces some behavioral changes these includes head trauma, fever, hyperthyroidism , fever, delirium (state of mental confusion that causes confused thinking, emotional disturbance, etc).Physical disorder may causes a some different disorder such as genetic disorder, injury & serious illness (27).

Some physical disorder may also affects the person physical capacity, mobility and changes in behavior.

#### Example of some physical disorders:-

Certain types of physical disorder/disabilities includes:-

- Acquired brain injury
- Spinal cord injury
- Spinal bifida

**Acquired brain injury** is defined as the damage of brain after birth and this type of disorder caused by a use of alcohol or drugs, infections and disease (include AIDS, Cancer & lack of oxygen) etc.

It may also affects to changes in behavior, emotions, personality, physical changes, lack of thinking and senses etc. the effect of brain injury may be permanent or temporary.

**Spinal cord injury (SPI)** affects the many area of the person body such as cardio vascular system, respiratory

system, bowel function, body temperature, sensory abilities etc and SPI also affects the mobility and may be cause paralysis. In some cases person loss of function below the chest, loss of function below the neck.

**Spinal bifida** is defined as incomplete formation/development of spinal cord in utero (in women uterus/womb).

A person with suffer from spinal bifida may cause some severe/mild physical disability such as paralysis, deformity in spinal cord, learning difficulties and weakness in legs. Spinal bifida may be prevent by the adequate amount of intake of folate by the mother in early pregnancy.

**Mental disorder**:- Mental disorder affects the mental health conditions such as changes in mood, behavior , thinking and affects the brain functioning etc. it is also known as Psychiatric disorder.(25,28)

#### Example of some mental disorder (25):-

Different types of mental disorder such as:-

- Anxiety disorder
- Epilepsy
- Schizophrenia
- Tourette syndrome
- Depression
- Disruptive mood dysregulation disorder (DMDD)

**Epilepsy** is a neurological condition/brain disorder that causes repeated seizures (uncontrolled electric disturbance in brain) (25).

These type of disorder affects the change in behavior, loss of consciousness and affects the motility and some other different causes of epilepsy such as brain injuries, brain infection, structural abnormalities in brain and some genetic factor also cause epilepsy.

Some symptoms shows and indicate the person may suffer from epilepsy such as confused memory, loss of consciousness, anxiety, disturbance in sensory or mental function etc.

**Tourette syndrome** is a complex neurological/ brain disorder it is characterized by involuntary movement & repetitive vocalization called as **tics** (uncontrolled movement of body parts such as eye, head, mouth, shoulder shrugging).

#### Two types of tics such as:-

- **Vocal tics** is characterized by involuntary repetitive vocalization (sounds) includes **throat clearing, tongue clicking, grunting (repeating words or phrases), sniffing, barking etc.**
- **Motor tics** is characterized by movements of body parts such as **eye blinking, head jerking, nose twitching, mouth movement, shoulder shrugging or jumping up & down.**

**Genetic disorder**:- genetic disorder is caused by the abnormalities formed by the genome (29). Different examples of genetic disorders such as:-

- Down syndrome
- Cystic fibrosis
- Hemophilia
- Sickle cell anemia
- Color blindness

**Cystic fibrosis** is a genetic disorder. It affects the reproductive system, digestive system etc. This type of genetic disorder also affects the person mucus (thick & sticky), sweat glands and respiratory system may be causes lung damage.

Cystic fibrosis may be characterized by some other symptoms such as sinus infection, poor growth, infertility, liver damage, diabetes etc.

A person may suffer from cystic fibrosis can also have low salt in the body and it also causes some problem includes cramps, dehydration and fatigue etc.

**Behavioral disorder:-** Behavior disorder is a type of psychological disorder they affects the directly behavior of person. It is characterized by inappropriate behavior (fighting, insulting, cursing, etc), always blame other person, argues, non-cooperative, hyperactivity, starts unnecessary fight etc (25,28).

According to **American Psychiatric Association** different examples of behavior disorder can be identified such as (25):-

- Conduct disorder (CD)
- Oppositional defiant disorder (ODD)
- Attention deficit hyperactivity disorder/ Attention deficit disorder or (ADHD)
- Learning disorder/disabilities
- Autism spectrum disorder
- Intermittent explosive disorder

**Autism spectrum disorder** according to **APA** this type of disorder affects the children in variety of ways such as behavior, socially. It is also known as neurological disorder and the symptoms may begin in early as childhood (25).

**Oppositional defiant disorder** is a mental condition but this type of disorder affects during infancy & adolescence. It is characterized by Anger, easily irritated by person, vindictive behavior, arguing with adult, speaking harshly, etc. Early diagnosis is required because it can cause serious problems.

#### Some side effect of the medication of behavior disorder:-

- Insomnia (sleep disorder)
- Appetite reduction (loss of appetite)
- Tremors (vibration, movement in one or more parts of body )
- Depression (mental health disorder)
- Irregular/Improper heart beat

#### Example of Disorder

**Diabetes mellitus (DM)** is the biggest disorder or problem in health sector in our country. It is a most common chronic metabolic/ endocrine disorder. Which causes some chronic deficiency, defects and may be cause serious health problem includes hyperglycemia / high blood sugar (deficiency in insulin secretion, action and disturbance of carbohydrate, fat and protein metabolism),

hyperlipidaemia, hypoinsulinaemia, hyper aminoacidemia and may be damage some tissue and causes severe complications such as cardiovascular complications, ulceration and sometimes causes ketonaemia etc (30,31,32). Diabetes mellitus is a growing severe public health problem in developed and non-developed both countries. Both types of diabetes causes severe health problem (33).

#### Classification of DM

On the basis of Etiology factor and clinical presentation diabetes mellitus is classified as following types:-

- Type 1 diabetes mellitus
- Type 2 diabetes mellitus
- Gestational diabetes
- Other specific types

**Type 1 diabetes mellitus** also known as insulin dependent diabetes mellitus (IDDM) is caused by lack of insulin secretion by beta cells of the pancreas (30).

IDDM is characterized by the presence of islet cell antibody (ICA), anti-glutamic acid decarboxylase. And this type of diabetes may be cause some severe Autoimmune diseases includes Grave's disease, Hashimoto's thyroiditis and Addison disease etc (31, 34, 35).

Some **clinical characteristics** of type 1 diabetes mellitus (30):-

Age of onset	Less than 20 years
Body mass	Low to normal
Plasma insulin level	Low or absent
Plasma glucagon level	Increased/High
Plasma glucose level	High (increased)
Insulin sensitivity	Normal
Disease Therapy	insulin

**Type 2 diabetes mellitus** also known as non-insulin dependent diabetes mellitus (NIDDM) , is caused by decreased sensitivity of target tissues to insulin (30). Or type 2 DM is commonly defined as disorder of insulin secretion.

Type 2 DM cause severe vessel atherosclerosis and most commonly includes hypertension, hyperlipidemia and obesity etc. some people suffer from type 2 diabetes die from cardiovascular diseases & end stage they cause renal complications or disease (31,36).

Some **clinical characteristics** of type 2 diabetes mellitus (30):-

Age of onset	Greater than 30 years
Body mass	Obese (weight gain)
Plasma insulin level	Normal to high initially
Plasma glucagon level	Increased/High
Plasma glucose level	High (increased)
Insulin sensitivity	Decreased
Disease Therapy	Thiazolidinedione's (pioglitazones), Biguanids (metformin), sulfonyl urea, exogenous insulin

**Gestational Diabetes (GD)** mellitus defined as initial recognition of glucose disturbance during pregnancy, It mainly seen in the second (II) or third (III) month of pregnancy and 4 % cases seen pregnant women suffer from diabetes mellitus.

A people suffer from GD have 30 to 50% chances may cause diabetes mellitus and highly risk may cause Type 2 diabetes (31,37).

### Symptoms of DM (31, 38)

Some common symptoms of diabetes mellitus:-

- Polyphagia (increase appetite)
- Polydipsia (increase thirst)
- High sugar level
- Polyuria (increased/frequent urination)
- obesity
- Other symptoms includes headache , blurred vision, appetite, slow healing of wound, weight loss, tiredness, itching in skin, nausea, vomiting, stomach-ache.
- Sometimes **skin rashes** may cause in diabetes mellitus the term known as **diabetic dermadrome**.

Now a days different type of therapies, **drugs/ medication** and some herbal medications are used to prevent/treat diabetes such as:-

- **KATP Channel Blocker (Sulfonylureas) (39)**
- Tolbutamide
- Glibenclamide
- Glipizide
- GlimepirideBiguanide
- Metformin
- **Thiazolidinediones**
- Pioglitazone
- **Meglitinide**
- Repaglinide

### Herbal plants used as anti diabetic agent

Some **herbal plants** are used to treat diabetes such as:-

- **Aegle marmelos** (bael) it is used to prevent diabetes (33).
- **Allium cepa** (onion) it is used to improve glycemic level in diabetes mellitus and also exhibit antioxidant and hypolipidaemic activity (33, 40).
- **Gymnema sylvestre** (Kavali, Dhuleti) its belongs to Asclepiadaceae family and the leaves to this plant contains Dihydroxy gymnemic triacetate active constituents it is useful as a anti diabetic .leaves of dhuleti is used to maintain the glycemic level in DM (41,33).
- **Momordica charantia** (Karela, bitter melon, bitter guard) it's belonging to Cucurbitaceae family. It possess antidiabetic, antihyperglycaemic property. Bitter guard is most commonly used as a hypoglycemic agent in India and other Asian countries etc (32, 42).

- **Ocimum sanctum** (tulsi, holy basil) In Thousand years ago, tulsi is known for its many medicinal/therapeutic property. The aqs. Extract of the leaves of tulsi possess many significant properties such as it is used to reduce blood sugar level (43) and The leaves of tulsi also used to treat some other diabetes symptoms such as tiredness, polydipsia( increased thirst), polyphagia(increased appetite) etc (32).
- **Trigonella foenum-graecum** (fenugreek) its belonging to Fabaceae family.seeds of these plant is used to treat diabetes. (33, 41).
- **Azadirachta indica** its most common name is Neem/Nimtree. It is belongs to Meliaceae family. In ancient times, neem is known for its many medicinal properties. And the leaf of neem is exhibits many medicinal property such as used to decrease blood sugar level (antihyperglycemic agent ) , Hepatoprotective, anti malarial, anti-bacterial properties etc. (32,44).

### Sketch border line between Disease and Disorder

The term disease and disorder are interchangeably but they are not the same thing and there is a wide difference between disease and disorder (3).

One of the major difference between disease and disorder is

- **Disease** can be transmitted from one person to another person. For example **Tuberculosis, malaria, typhoid** etc. In simple term it is defined as disease is communicable/ contagious (5).
- **Disorder** is not transmitted from one person to another person. For example **Diabetes, Hypertension, anxiety** etc. disorder is non-communicable/ non-contagious (5).

Second of the major difference between disease and disorder is

- **Disease** is caused by an external factor such as virus, bacteria and some other environmental factor. For example mosquitoes cause malaria through bite of the surface of skin and via skin internal organs/ tissue/blood are affected cause a disease (5).
- **Disorder** is result of internal/intrinsic factor. It's a good example is genetic factor and mostly it is caused by birth defects, genetic malfunctioning etc (5).

Other differences (45, 3)

- The disease is also transmitted through a virus or bacteria. An example of a virus that causes a disease is the Human Immunodeficiency Virus (HIV). It is transmitted through sexual contact or in the exposure of an infected blood.
- **Disease** is a condition it is characterized by functional disability, structural change, and disease shows by a specific signs and symptoms. Disease is diagnosed by a doctor.
- **Disorder** is a condition that affects physical and mental function of the body and disorder is mostly diagnosed by a psychiatrist.

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