



Department of Distance Education

Punjabi University, Patiala

Class : B.Ed.-II

Semester : 4

Paper : XXIV (Health and Physical Education)

Medium : English

Unit : I

Lesson No.

- 1.1 : Human Nervous System: Parts And Its Functions
- 1.2 : Endocrine Glands: Functions And Location in the Body
- 1.3 : Diet and Nutrition: Components of Balanced Diet and their Sources, Concept of Calorific Value, Childhood Obesity-Causes and Prevention
- 1.4 : Common Childhood Illnesses: Causes and Prevention; Immunization

Department website : www.pbidde.org

HUMAN NERVOUS SYSTEM: PARTS AND ITS FUNCTIONS

- 1.1 Introduction
- 1.2 Main Organs/Parts of Human Nervous System
 - 1.2.1 The Central Nervous System (CNS)
 - 1.2.2 The Peripheral Nervous System
- 1.3 Functions of the Human Nervous System
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1.1 INTRODUCTION

The nervous system is a complex network of nerves and cells that carry messages to and from the brain and spinal cord to various parts of the body. The nervous system includes both the Central nervous system and Peripheral nervous system. The Central nervous system is made up of the brain and spinal cord and The Peripheral nervous system is made up of the Somatic and the Autonomic nervous systems.

1.2 MAIN ORGANS/PARTS OF HUMAN NERVOUS SYSTEM

The main organs/parts of nervous system are explained under the following grounds:-

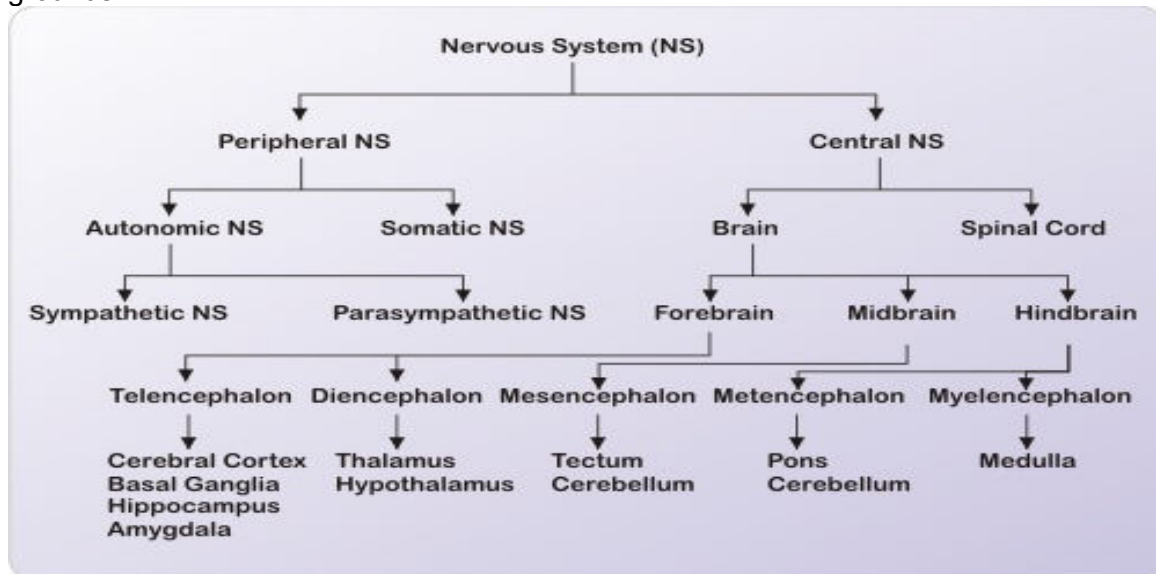


Figure 1.1 Nervous system

1.2.1 The Central Nervous System (CNS)

The central nervous system is divided into two major parts: the brain and the spinal cord.

A) The Brain

The brain lies within the skull and is shaped like a mushroom. The brain consists of four principal parts:

- The brain stem
- The cerebrum
- The cerebellum
- The diencephalon

The brain weighs approximately 1.3 to 1.4 kg. It has nerve cells called the neurons and supporting cells called the glia. There are two types of matter in the brain: grey matter and white matter. Grey matter receives and stores impulses. Cell bodies of neurons and neuroglia are in the grey matter. White matter in the brain carries impulses to and from grey matter. It consists of the nerve fibers (axons).

The Brain Stem

The brain stem is also known as the Medulla oblongata. It is located between the pons and the spinal cord and is only about one inch long.

The Cerebrum

The cerebrum forms the bulk of the brain and is supported on the brain stem. The cerebrum is divided into two hemispheres. Each hemisphere controls the activities of the side of the body opposite that hemisphere.

The hemispheres are further divided into four lobes:

- Frontal lobe
- Temporal lobes
- Parietal lobe
- Occipital lobe

The Cerebellum

This is located behind and below the cerebrum.

The Diencephalon

The diencephalon is also known as the fore brain stem. It includes the thalamus and hypothalamus. The thalamus is where sensory and other impulses go and coalesce. The hypothalamus is a smaller part of the diencephalon

Other Parts of the Brain

Other parts of the brain include the midbrain and the Pons:

- The midbrain provides conduction pathways to and from higher and lower centers

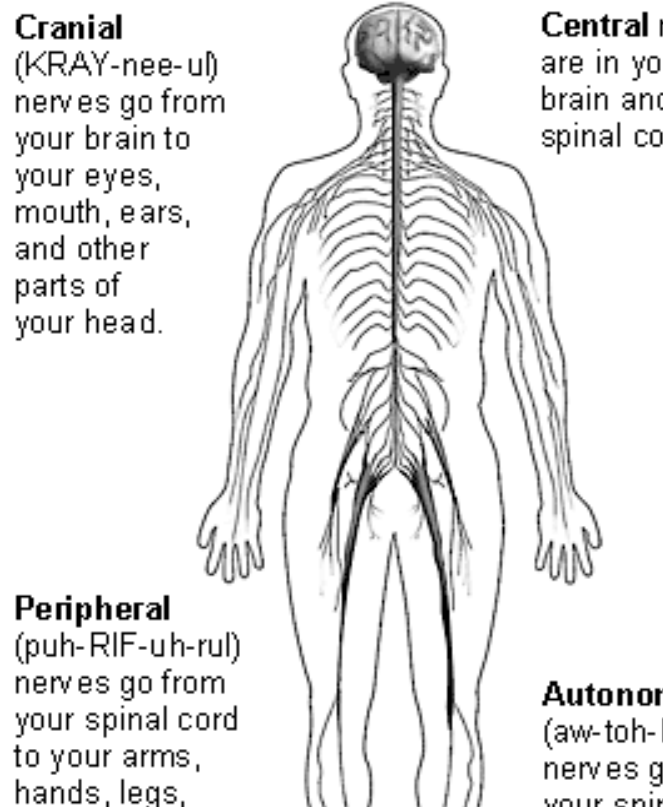
- The Pons acts as a pathway to higher structures; it contains conduction pathways between the medulla and higher brain centers

B) The Spinal Cord

The spinal cord is along tube like structure which extends from the brain. The spinal cord is composed of a series of 31 segments. A pair of spinal nerves comes out of each segment. The region of the spinal cord from which a pair of spinal nerves originates is called the spinal segment. Both motor and sensory nerves are located in the spinal cord. The spinal cord is about 43 cm long in adult women and 45 cm long in adult men and weighs about 35-40 grams. It lies within the vertebral column, the collection of bones (back bone).

C) Other Parts of the Central Nervous System

The meninges are three layers or membranes that cover the brain and the spinal cord. The outermost layer is the Dura mater. The middle layer is the arachnoids, and the innermost layer is the pia mater. The meninges offer protection to the brain and the spinal cord by acting as a barrier against bacteria and other microorganisms. The Cerebrospinal Fluid (CSF) circulates around the brain and spinal cord. It protects and nourishes the brain and spinal cord.



D) Neurons

The neuron is the basic unit in the nervous system. It is a specialized conductor cell that receives and transmits electrochemical nerve impulses. A typical neuron has a cell body and long arms that conduct impulses from one body part to another body part.

There are three different parts of the neuron:

- The cell body
- Dendrites
- Axon

- **Cell Body of a Neuron**

The cell body is like any other cell with a nucleus or control center.

- **Dendrites**

The cell body has several highly branched, thick extensions that appear like cables and are called dendrites. The exception is a sensory neuron that has a single, long dendrite instead of many dendrites. Motor neurons have multiple thick dendrites. The dendrite's function is to carry a nerve impulse into the cell body.

- **Axon**

An axon is a long, thin process that carries impulses away from the cell body to another neuron or tissue. There is usually only one axon per neuron.

E) Myelin Sheath

The neuron is covered with the Myelin Sheath or Schwann Cells. These are white segmented covering around axons and dendrites of many peripheral neurons. The covering is continuous along the axons or dendrites except at the point of termination and at the nodes of Ranvier. The neurilemma is the layer of Schwann cells with a nucleus. Its function is to allow damaged nerves to regenerate. Nerves in the brain and spinal cord do not have a neurilemma and, therefore cannot recover when damaged.

F) Types of Neuron

Neurons in the body can be classified according to structure and function. According to structure neurons may be multipolar neurons, bipolar neurons, and unipolar neurons:

- Multipolar neurons have one axon and several dendrites. These are common in the brain and spinal cord
- Bipolar neurons have one axon and one dendrite. These are seen in the retina of the eye, the inner ear, and the olfactory (smell) area.
- Unipolar neurons have one process extending from the cell body. The one process divides with one part acting as an axon and the other part functioning as dendrite. These are seen in the spinal cord.

1.2.2 The Peripheral Nervous System

The Peripheral nervous system is made up of two parts:

- Somatic nervous system
- Autonomic nervous system

A) Somatic Nervous System

The somatic nervous system consists of peripheral nerve fibers that pick up sensory information or sensations from the peripheral or distant organs (those away from the brain like limbs) and carry them to the central nervous system. These also consist of motor nerve fibers that come out of the brain and take the messages for movement and necessary action to the skeletal muscles. For example, on touching a hot object the sensory nerves carry information about the heat to the brain, which in turn, via the motor nerves, tells the muscles of the hand to withdraw it immediately. The whole process takes less than a second to happen. The cell body of the neuron that carries the information often lies within the brain or spinal cord and projects directly to a skeletal muscle.

B) Autonomic Nervous System

Another part of the nervous system is the Autonomic Nervous System. It has three parts:

- The sympathetic nervous system
- The parasympathetic nervous system
- The enteric nervous system

This nervous system controls the nerves of the inner organs of the body on which humans have no conscious control. This includes the heartbeat, digestion, breathing (except conscious breathing) etc. The nerves of the autonomic nervous system enervate the smooth involuntary muscles of the (internal organs) and glands and cause them to function and secrete their enzymes etc. The Enteric nervous system is the third part of the autonomic nervous system. The enteric nervous system is a complex network of nerve fibers that innervate the organs within the abdomen like the gastrointestinal tract, pancreas, gall bladder etc. It contains nearly 100 million nerves.

C) Neurons in the Peripheral Nervous System

The smallest worker in the nervous system is the neuron. For each of the chain of impulses there is one preganglionic neuron, or one before the cell body or ganglion, that is like a central controlling body for numerous neurons going out peripherally. The preganglionic neuron is located in either the brain or the spinal cord. In the autonomic nervous system this preganglionic neuron projects to an autonomic ganglion. The postganglionic neuron then projects to the target organ. In the somatic nervous system there is only one neuron between the central nervous system and the target organ while the autonomic nervous system uses two neurons.

1.3 FUNCTIONS OF THE HUMAN NERVOUS SYSTEM

The nervous system has 3 main functions: sensory, integration, and motor.

- **Sensory:** the sensory motor function of the nervous involves accumulating data from sense organ that monitor the body's internal and external conditions. These signals are then passed on to the central nervous system (CNS) for further processing by afferent nerves.
- **Integration:** the process of integration is the processing of the many sensory signals that are passed into the CNS at any given time. These signals are judged, compared, used for decision making, disposed or decided to memory as held appropriate.
- **Motor:** Once the networks of inter neurons in the CNS evaluate sensory information and decide on an action, they stimulate efferent neurons. Efferent neurons (also called motor neurons) carry signals from the gray matter of the CNS through the nerves of the peripheral nervous system to effectors cells.

1.4 SUGGESTED QUESTIONS

1. Explain the types of human nervous system and its parts.
2. What are the main functions of human nervous system?

1.5 RECOMMENDED BOOKS

1. <http://www.cse.iitk.ac.in/users/hk/cs781/NervousSystem.pdf/>
2. <http://classvideos.net/anatomy/pdf/3708091011-pdf.pdf>
3. <http://www.bio12.com/ch17/Notes.pdf>
4. highered.mcgraw-hill.com/.../mhriib_ch11.pdf
5. http://www.sfn.org/skins/main/pdf/brainfacts/2008/brain_facts.pdf
6. <http://www.freeinfosociety.com/media/pdf/4423.pdf>

ENDOCRINE GLANDS: FUNCTIONS AND LOCATION IN THE BODY**STRUCTURE**

- 2.1 Introduction
- 2.2 The Endocrine Network
- 2.3 Glands of Endocrine System and their Functions
 - 2.3.1 Hypothalamus
 - 2.3.2 Pineal Gland
 - 2.3.3 Pituitary Gland
 - 2.3.4 Thyroid Gland
 - 2.3.5 Parathyroid Gland
 - 2.3.6 Thymus Gland
 - 2.3.7 Adrenal Gland
 - 2.3.8 Pancreas Gland
 - 2.3.9 Ovaries Gland
 - 2.3.10 Testes Gland
- 2.4 Suggestions Questions
- 2.5 Recommended Books

2.1 INTRODUCTION

The word endocrine is Greek word means internal secretion. These glands are ductless glands which have no ducts and they depend upon the blood and lymph to carry their secretion to the target area through capillaries. The endocrine glands that secrete chemicals called hormones to help our body for proper functioning; the hormones secreted by Endocrine glands are chemical signals that organize a range of bodily functions. The endocrine system works to regulate certain internal processes.

The endocrine system helps control the following processes and systems:

- Growth and development
- Homeostasis (the internal balance of body systems)
- Metabolism (body energy levels)
- Reproduction
- Response to stimuli (stress and/ or injury)

2.2 THE ENDOCRINE NETWORK

The endocrine system completes these tasks through its network of glands, which are small but highly important organs that produce, store, and secrete hormones. These glands produce different types of hormones that evoke a specific response in other cells, tissues, and/ or organs located throughout the body. The hormones reach

these faraway targets using the blood stream. Like the nervous system, the endocrine system is one of your body's main communicators. But instead of using nerves to transmit information, the endocrine system uses blood vessels to deliver hormones to cells.

2.3 GLANDS OF ENDOCRINE SYSTEM AND THEIR FUNCTIONS

The glands of the endocrine system are:

- Hypothalamus
- Pineal Gland
- Pituitary Gland
- Thyroid
- Parathyroid
- Thymus
- Adrenal
- Pancreas
- Ovaries
- Testes

2.3.1 Hypothalamus

The hypothalamus is involved in many functions of the autonomic nervous system; it is considered the link between the nervous system and the endocrine system. Hypothalamus regulates the internal balance of the body known as homeostasis. It is responsible for maintaining your body's internal balance, which is known as homeostasis. To maintain homeostasis the hypothalamus regulates some major functioning of the body including:

- Heart rate and blood pressure
- Body temperature
- Fluid and electrolyte balance, including thirst
- Appetite and body weight
- Glandular secretions of the stomach and intestines
- Production of substances that influence the pituitary gland to release hormones
- Sleep cycles

Anatomy of the Hypothalamus

The hypothalamus is located below the thalamus and above the pituitary gland and brain stem. It is about the size of an almond.

Hormones of the Hypothalamus

The hypothalamus is highly involved in pituitary gland function. When it receives a signal from the nervous system, the hypothalamus secretes substances known as neurohormones that start and stop the secretion of pituitary hormones.

Primary hormones secreted by the hypothalamus include:

- **Anti-Diuretic Hormone (ADH):** This hormone increases water absorption into the blood by the kidneys.
- **Corticotropin-Releasing Hormone (CRH):** CRH sends a message to the anterior pituitary gland to stimulate the adrenal glands to release corticosteroids, which help regulate metabolism and immune response.
- **Gonadotropin-Releasing Hormone (GnRH):** GnRH stimulates the anterior pituitary to release follicle stimulating hormone (FSH) and luteinizing hormone (LH), which work together to ensure normal functioning of the ovaries and testes.
- **Growth Hormone-Releasing Hormone (GHRH) or Growth Hormone-Inhibiting Hormone (GHIH) (also known as somatostatin):** GHRH prompts the anterior pituitary to release Growth Hormone (GH); GHIH has the opposite effect. In children, GH is essential to maintaining a healthy body composition. In adults, it aids healthy bone and muscle mass and affects fat distribution.
- **Oxytocin:** Oxytocin is involved in a variety of processes, such as orgasm, the ability to trust, body temperature, sleep cycles, and the release of breast milk.
- **Prolactin-Releasing Hormone (PRH) or Prolactin-Inhibiting (PIH) (also known as dopamine):** PRH prompts the anterior pituitary to stimulate breast milk production through the production of prolactin. Conversely, PIH inhibits prolactin, and thereby, milk production.
- **Thyrotropin Releasing Hormone (TRH):** TRH triggers the release of thyroid stimulating hormone (TSH), which stimulates release of thyroid hormones, which regulate metabolism, energy, and growth and development.

2.3.2 Pineal Gland

The pineal gland develops from the roof of the diencephalons, a section of the brain, and is located behind the third cerebral ventricle in the brain midline (between the two cerebral hemispheres). Its name is derived from its shape, which is similar to that of a pinecone. In adult humans it is about 0.8 cm (0.3 inch) long and weighs approximately 0.1 gram (0.004 ounce).

The Pineal Gland Hormone

Melatonin:

- The pineal gland secretes a single hormone – melatonin. It has two primary functions
- Control your cardiac rhythm
- Regulate certain reproductive hormones.

Circadian Rhythm

Melatonin secretion is low during the daylight hours and high during dark periods, which has some influence over your reaction to photoperiod (the length of day versus night). Our circadian rhythm is a 24-hour biological cycle characterized by sleep-wake patterns. Light exposure stops the release of melatonin, and in turn, this helps control your circadian rhythms.

Reproduction

Melatonin blocks the secretion of gonadotropins from the anterior pituitary gland. These hormones aid in the proper development and functioning of the ovaries and testes.

2.3.3 Pituitary Gland

The pituitary gland is often called the “master gland” because its hormones control other parts of the endocrine system, namely the thyroid gland, adrenal glands, ovaries and testes. The pituitary gland has two parts – the anterior lobe and posterior lobe both have different functions.

Anatomy of the Pituitary Gland

The pituitary gland is only about 1/3 of an inch in diameter (that’s about as large as a pea) and located at the base of the brain, behind the bridge of your nose. The pituitary gland is very close to another part of the brain, called the hypothalamus.

The pituitary gland has two lobes the anterior lobe and posterior lobe.

Hormones of Anterior Lobe

- **Adrenocorticotropic Hormone (ACTH):** ACTH stimulates the adrenal glands to produce hormones.
- **Follicle-Stimulating Hormone (FSH):** FSH works with LH to ensure normal functioning of the ovaries and testes.
- **Growth Hormone (GH):** GH is essential in early years to maintaining a healthy body composition and for growth in children. In adults, it aids healthy bone and muscle mass and affects fat distribution.
- **Luteinizing Hormone (LH):** LH works with FSH to ensure normal functioning of the ovaries and testes.
- **Prolactin:** Prolactin stimulates breast milk production.
- **Thyroid-Stimulating Hormone (TSH):** TSH stimulates the thyroid gland to produce hormones.

Posterior Lobe Hormones

- **Anti-Diuretic Hormone (ADH):** This hormone prompts the kidneys to increase water absorption in the blood.
- **Oxytocin:** Oxytocin is involved in a variety of processes, such as contracting the uterus during child birth and stimulating breast milk production.

2.3.4 Thyroid Gland

The thyroid gland is located in the front of neck, crossing between the C5 and T1 vertebrae. It is divided into two lobes which are connected by an isthmus. Without a functioning thyroid, the body would not be able to break down proteins and it would not be able to process carbohydrates and vitamins. For this reason, problems with this gland can lead to uncontrollable weight gain. For many people, these irregularities can be controlled through medications, as well as a modification of their diet.

However, there is one other controlling factor. The gland cannot produce hormone on its own. It needs the assistance of the pituitary gland, which creates thyroid stimulating hormone (TSH).

Hormones of the Thyroid

The two main hormones the thyroid produces and releases are T3 (tri-iodothyronine) and T4 (thyroxine). A thyroid that is functioning normally produces approximately 80% T4 and about 20% T3, though T3 is the strongest of the pair, the thyroid also produces calcitonin, which helps control blood calcium levels.

2.3.5 Parathyroid Gland

The four parathyroid glands are generally found on the back side of the thyroid. They're about the size and shape of a grain of rice. Parathyroid glands regulate calcium levels.

Parathyroid Hormone

The parathyroid glands produce a hormone called parathyroid hormone (PTH). PTH raises the blood calcium level by:

- Breaking down the bone (where most of the body's calcium is stored) and causing calcium release
- Increasing the body's ability to absorb calcium from food
- Increasing the kidney's ability to hold on to calcium that would otherwise be lost in the urine.

2.3.6 Thymus Gland

The thymus is a soft, roughly triangular organ having two thymic lobes situated in the upper anterior (front) part of your chest directly behind your sternum and between your lungs. The thymus reaches its maximum weight (about 1 ounce) during puberty. The thymus gland will not function throughout a full lifetime but the function of the thymus is to receive immature T cells that are produced in the red bone marrow and train them into functional, mature T cells that attack only foreign cells.

Hormone of the Thymus:

Thymus secretes hormone called Thymosin which enhances immune responses. It also stimulates certain pituitary gland hormones (growth hormone, luteinizing hormone, prolactin, gonadotropin releasing hormone, and adrenocorticotrophic hormone (ACTH). Thymosin stimulates the development of T cells. Throughout your childhood years, white blood cells called lymphocytes pass through the thymus, where they are transformed into T cells. Once T cells have fully grown in the thymus, they migrate to the lymph nodes (groups of immune system cells) throughout the body, where they aid the immune system in fighting disease.

2.3.7 Adrenal Gland

The adrenal glands are small, yellowish organs having triangular shape that measure about 1.5 inches in height and 3 inches in length. They are located on top of each kidney. Each adrenal gland is comprised of two distinct structures the outer part of the adrenal glands is called adrenal cortex. The inner region is known as the adrenal medulla.

1. The adrenal cortex – the outer part of the gland – produces hormones that are vital to life, such as cortisol and aldosterone.
2. The adrenal medulla – the inner part of the gland produces non essential hormones, such as adrenaline (which helps your body react to stress).

Adrenal Cortex Hormones

The adrenal cortex produces three hormones:

- **Mineralocorticoids:** The principal mineralocorticoid is aldosterone, which helps to maintain the body's salt and water levels and helps in regulating blood pressure. Without aldosterone, the kidney loses excessive amounts of salt (sodium) and water which leads to severe dehydration.
- **Glucocorticoids:** Mainly cortisol the hormone regulates body metabolism how the body converts fats, proteins, and carbohydrates to energy. It also helps regulate blood pressure and cardiovascular function. Cortisol stimulates glucose production by mobilizing amino acids and free fatty acids.
- **Adrenal Androgens:** The adrenal cortex also releases small amounts of male and female sex hormones. But their affect is usually dominated by ovaries or testes which produce greater amounts of sex hormones.

Adrenal Glands Hormones

Adrenal Medulla Hormones

- **Epinephrine:** Most people know epinephrine by its other name – adrenaline. This hormone rapidly responds to stress by increasing your heart rate and rushing blood to the muscles and brain. It also spikes your blood sugar level by helping convert glycogen to glucose in the liver. (Glycogen is the liver's storage form of glucose).
- **Norepinephrine:** Also known as noradrenaline, this hormone works with epinephrine in responding to stress. However, it can cause vasoconstriction (the narrowing of blood vessels). This results in high blood pressure.

2.3.8 Pancreas Gland

The pancreas is unique gland it is both an endocrine and exocrine gland, an exocrine function that helps in digestion and an endocrine function that regulates blood sugar. The pancreas is a 6 inch-long flattened gland that is located behind the stomach in the upper left abdomen and surrounded by other organs including the small intestine, liver and spleen.

Hormones of the Pancreas

Primary hormones secreted by the pancreas include:

- **Gastrin:** Gastrin helps in digestion by stimulating certain cells in the stomach to produce acid.
- **Glucagon:** Glucagon helps insulin maintain normal blood glucose by working in the opposite way of insulin. It stimulates your cells to release glucose, and this raises your blood glucose levels.
- **Insulin:** Insulin regulates blood glucose by allowing many of your body's cells to absorb and use glucose. In turn, this drops blood glucose levels.
- **Somatostatin:** Somatostatin is secreted to maintain a balance of glucose and/ or salt in the blood, when levels of other pancreatic hormones, such as insulin and glucagons, get too high.
- **Vasoactive Intestinal Peptide (VIP):** This hormone helps control water secretion and absorption from the intestines by stimulating the intestinal cells to release water and salts into the intestines.

2.3.9 Ovaries Gland

The ovary is a ductless reproductive gland of the female. Each woman has two ovaries. They are oval in shape, about four centimeters long and lie on either side of womb (uterus) against the wall of the pelvis. Ovaries produce egg cells that maintain the health of the female reproductive system. The ovaries, like their male counterpart, the testes, are known as gonads.

Hormones of the Ovaries

Ovaries produce and release two groups of sex hormones – progesterone and estrogens which regulate menstruation and control the development of the sex organs.

Progesterone and Estrogens Production and Function

Progesterone and estrogens are necessary to prepare the uterus for menstruation, and their release is triggered by the hypothalamus. Once you reach puberty, the ovaries release a single egg each month this is called ovulation. The hypothalamus sends a signal to the pituitary gland to release gonadotrophic substances (follicle stimulating hormone and luteinizing hormone). These hormones are essential to normal reproductive function – including regulation of the menstrual cycle. As the egg migrates down the fallopian tube, progesterone is released. It is secreted by a temporary gland formed within the ovary after ovulation called the corpus luteum. Progesterone prepares the body for pregnancy by causing the uterine lining to thicken. If a woman is not pregnant, the corpus luteum disappears. If a woman is pregnant, the pregnancy will trigger high levels of estrogen and progesterone, which prevent further eggs from maturing. Progesterone is secreted to prevent uterine contractions that may disturb the growing embryo. The hormone also prepares the breasts for lactation. Increased estrogen levels near the end of pregnancy alert the pituitary gland to release oxytocin,

which causes uterine contractions. Before delivery, the ovaries release relaxin, which as the name suggests, loosens the pelvic ligaments in preparation for labor.

2.3.10 Testes Gland

The testes (plural) are organs of the male reproductive system. They are the glands where sperm and testosterone are produced. Testes are twin oval-shaped organs lie behind the penis in a pouch of skin called the scrotum which is the loose pouch of skin that hangs outside the body behind the penis which provides a cooler temperature for the organs. A cooler environment is necessary for health sperm production.

Hormone of the Testes-Testosterone:

The main hormone secreted by the testes is testosterone, an androgenic hormone, it is involved in many of the processes that transition a boy to manhood, including:

- Healthy development of male sex organs
- Growth of facial and body hair
- Lowering of the voice
- Increase in height
- Increase in muscle mass
- Maintaining sex drive
- Promoting production of sperm
- Maintaining healthy levels of muscle and bone mass.

2.4 SUGGESTED QUESTIONS

1. Explain the types of nervous and its parts.
2. Parts of Brain and their functions.

2.5 BOOKS RECOMMENDED

1. Bucher, C. A. (1964). *Foundations Of Physical Education*. New York: Mosby and Company.
2. Kang Gurpreet Singh & Deol Nishan Singh (2013). *An Introduction to Health and Physical Education*, 21st century publications, India.
3. Alderman, H., Behrman, J. R., Lavy, V., & Menon, R. (1997). Child Nutrition, Child Health and School Enrolment, Policy Research Working Paper 1700 (January).

LESSON NO. 1.3

DIET AND NUTRITION: COMPONENTS OF BALANCED DIET AND THEIR SOURCES, CONCEPT OF CALORIFIC VALUE, CHILDHOOD OBESITY-CAUSES AND PREVENTION**STRUCTURE**

- 3.1 Introduction
- 3.2 Food
 - 3.2.1 Functions of Food
- 3.3 Diet
 - 3.3.1 Balanced Diet
 - 3.3.2 Components of the Balanced Diet
 - 3.3.3 Calorific Value
- 3.4 Childhood Obesity – Causes and Prevention
 - 3.4.1 Factors Causing Obesity in Children
- 3.5 Malnutrition
 - 3.5.1 Causes of Malnutrition
 - 3.5.2 Remedies of Malnutrition
- 3.6 Suggested Questions
- 3.7 Recommended Books

3.1 INTRODUCTION

Nutrition is the sum total of the processes involved in the taking in and the utilization of food substances by which growth, repair and maintenance of the body are accomplished. It involves ingestion, digestion, absorption and assimilation. Nutrients are stored by the body in various forms and drawn upon when the food intake is not sufficient.

Nutrition is one of the most important elements of our lives. It has a profound impact on our health status, as well as many other factors.

3.2 FOOD

Food is a substance which produces heat and energy in the body, build and repairs tissues. It also contains some roughage which adds quantity or bulk to our diet.

3.2.1 Functions of Food

- It produces heat and energy in our body
- It builds up new tissues
- It keeps up the body temperature
- It protects from disease
- It helps in the production of compounds that regulate body processes

- In nutshell we can say food is very important for life.

3.3 DIET

Diet is the daily intake of food by the human body. The body is a living organism that grows, functions and acts with the help of food.

3.3.1 Balanced Diet

Eating a balanced diet means choosing a wide variety of foods and drinks from all the food groups. It also means eating certain thing in moderation, namely saturated fat, trans fat, cholesterol, refined sugar, salt and alcohol. The goal is to take in nutrients you need for health at the recommended levels.

“A balanced diet is food intake that includes all of the dietary needs of the organism in the correct proportions”.

3.3.2 Components of the Balanced Diet

1. Proteins
2. Carbohydrates
3. Fats
4. Minerals
5. Vitamins
6. Water

1. Protein:

Protein is an essential nutrient. There is no life without protein. Protein is contained in every part of your body, the skin, muscles, hair, blood, body organs, eyes, even fingernails and bones next to water protein is the most plentiful substance in your body.

⇒ Functions of Proteins

Proteins are classified as vegetable and animal, depending upon their sources. Their chief sources are as under:

- i. Vegetable protein e.g. beans, peas, Lentils (dals) containing legumes wheat haring gluten.
- ii. Animal proteins: egg, fish, cheese, milk.

2. Carbohydrates

Carbohydrates play a major role in promoting your health fitness. They form a major part of your food and help a great deal in building your body strength by way of generating energy. In fact they are among the three prominent macronutrients that serve as excellent energy providers, the other two being fats and proteins.

⇒ Functions of Carbohydrates:

1. The primary function of carbohydrates in the body is to supply energy. Each gram of carbohydrates, as starch and sugar, provides 4 kcal/g.

2. Carbohydrates are a source of readily available energy, which is needed for physical activities as also the work of the body cells.
3. Carbohydrates act also as reserve fuel supply in the form of glycogen, stored in muscles and liver.
4. Carbohydrates are needed to prevent dehydration.
5. Carbohydrates are an important part of some compounds which increase our resistance to infection.

⇒ **Sources of Carbohydrates:**

Carbohydrates include kind of sugar and starch. Its main sources are cereals, millets, rice, potatoes, wheat, maize, barley, oat, arrow-root, banana, sweet potatoes, sugarcane etc.

3. Fats:

Fats along with proteins and carbohydrates are one of the three nutrients used as energy sources of the body. The energy produced by fats as 9 calories per gram. Protein and carbohydrates each provides 4 calories per gram.

⇒ **Functions of Fats:**

1. Fat provides needed energy. It is difficult to eat the large amounts of food in a very low fat diet to get all the energy you need.
2. Provides insulation under the skin from the cold and the heat.
3. Protects organs and bones from shock and provides support for organs.

⇒ **Sources of Fats:**

Fats are found in both animals and plant origin we get it from oil seeds, coconut, milk product, butter, ghee, egg yolk, fish etc.

4. Minerals:

Your body needs minerals to build strong bones, create hormones and regulate your heartbeat. Minerals help release the energy from food and improve brain functioning, which can help you think more clearly and make wiser decision.

A mineral is defined as inorganic elements containing to carbon that remains as ash when food is burned. Although as many as 40 minerals are in existence, the table below describes the 08 minerals that are essential to human nutrition and list their functions and sources in food.

5. Vitamins:

Vitamins don't give you calories or energy but do help you stay healthy. You cannot make vitamins so you must get them from the foods you eat.

There are two types of vitamins:

- i. Fat soluble vitamins include vitamins A, D, E and K and they can be stored in your body. High amounts of fat soluble vitamins are not recommended, as these can cause health problems.

- ii. Water soluble vitamins include vitamins B1, B2, B3, B6, B12 and Vitamin C. They are not stored in large amount in the body, and any extra is lost through your urine.

The following table will help you to understand why it is important to get enough of some of the common vitamins and lists the best food sources of these vitamins.

6. Water:

Clean and safe drinking water is an essential component of a healthy diet. According to Medline plus, how much water you need depends on “your size, activity level and weather”.

Man cannot live without water and it is the best fluid to drink in any form. 75% of the body consists of water. The percentage of water in the body tends to decrease with age. Thus infant and children were larger water content than adults.

⇒ Functions of Water

- i. It helps in the digestion of food.
- ii. It saves the bones from becoming brittle and dry.
- iii. It helps in circulation of blood.
- iv. It regulates the body temperature.
- v. It supplies the mineral salt to the body.
- vi. It help for every chemical process.
- vii. It helps for all the tissue of body.

⇒ Sources of Water:

Certain foods like cucumber, green leafy vegetables, milk and water melon contains a high percentage of water.

3.3.3. Calorific Value

The energy value of a food indicates how much energy the human body can gain through metabolism. Foods are composed chiefly of carbohydrates, fats, proteins, water, vitamins, and minerals. Carbohydrates, fats, proteins and water represent virtually all the weight of food, with vitamins and minerals making up only a small percentage of the weight. Organisms derive food energy from carbohydrates, fats and proteins the other components like water minerals, vitamins and fibers provide little or no energy but they are very necessary for living. The energy value is specified in kilojoules (kJ) per 100 g or 100 ml.

The calorific value of each of these food elements is given below:

Carbohydrate = 4 Calories

Protein = 4 Calories

Fat = 9 Calories

3.4 CHILDHOOD OBESITY – CAUSES AND PREVENTION

Your body is made up of water, fat, protein, carbohydrate and various vitamins and minerals. If the size of fat cell increase than you are obese. Children who have a body mass index (BMI) at the same level or higher than 95 percent of their peers are

considered to be obese. BMI is a tool used to determine your “weight status”. BMI is calculated using your height and weight. Your BMI percentile (where your BMI value falls in relation to other people) is then determined using your gender and age. Childhood obesity is a serious health threat to children. Kids in the obese category have surpassed simply being overweight and are at risk for a number of chronic health conditions. Poor health stemming from childhood obesity can continue into adulthood.

3.4.1 Factors Causing Obesity in Children

⇒ Diet:

Regularly eating high-calorie foods, such as fast foods, baked goods and vending machine snacks, can easily cause your child to gain weight. Candy and desserts also can cause weight gain, and more and more evidence points to sugary drinks, including fruit juices, as culprits in obesity in some people.

1. **Lack of Exercise:** Children who don't exercise much are more likely to gain weight because they don't burn as many calories. Too much time spent in sedentary activities, such as watching television or playing video games, also contributes to the problem.
2. **Family Factors:** If your child comes from a family of overweight people, he or she may be more likely to put on weight. This is especially true in an environment where high-calorie foods are always available and physical activity isn't encouraged.
3. **Psychological Factors:** Personal, parental and family stress can increase a child's risk of obesity. Some children overeat to cope with problems or to deal with emotions, such as stress, or to fight boredom. Their parents may have similar tendencies.
4. **Socio-economic Factors:** People in some communities have limited resources and limited access to supermarkets. As a result, they may opt for convenience foods that don't spoil quickly, such as frozen meals, crackers and cookies. In addition, people who live in lower income neighbourhoods might not have access to a safe place to exercise.

⇒ Suggestions

- Eat fresh fruits and vegetables.
- Eat lean proteins, such as chicken and fish.
- Eat whole grains, such as brown rice, whole-wheat pasta, and whole-grain breads.
- Eat low-fat dairy products, including skim milk, low-fat plain yogurt, and low-fat cheese.
- Do regular exercise.
- Play games having physical activity and avoid watching TV, computer and other gazettes.
- Harmful effect of obesity on the body.

- High blood pressure and high cholesterol, which are risk factors for cardiovascular disease (CVD).
- Increased risk of impaired glucose tolerance, insulin resistance, and type 2 diabetes.
- Breathing problems, such as asthma and sleep apnea.
- Joint problems and musculoskeletal discomfort.
- Fatty liver disease, gallstones, and gastro-esophageal reflux (i.e. heartburn).
- Childhood obesity is also related to
- Psychological problems such as anxiety and depression.
- Low self-esteem and lower self-reported quality of life.
- Social problems such as bullying and stigma.

⇒ **When your Weight is in a Healthy Range:**

- Your body more efficiently circulates blood.
- Your fluid levels are more easily managed.
- You are less likely to develop diabetes, heart disease, certain cancers and sleep apnea.

⇒ **Being Obese Can:**

- Raise blood cholesterol and triglyceride levels.
- Lower “good” HDL cholesterol. HDL cholesterol is linked with lower heart disease and stroke risk, so low LDL tends to raise the risk.
- Increase blood pressure.
- Induce diabetes. In some people, diabetes makes other risk factors much worse. The danger of heart attack is especially high for these people.

3.5 MALNUTRITION

Malnutrition is a broad term which refers to both under nutrition (sub nutrition) and over nutrition. Individuals are malnourished, or suffer from undernutrition if their diet does not provide them with adequate calories and protein for maintenance and growth, or they cannot fully utilize the food they eat due to illness. People are also malnourished, or suffer from overnutrition if they consume too many calories.

Malnutrition can also be defined as the insufficient excessive or imbalanced consumption of nutrients. Several different nutrition disorders may develop, depending on which nutrients are lacking or consumed in excess.

⇒ **Signs and Symptoms of Malnutrition**

- Loss of fat (adipose tissue)
- Breathing difficulties, a higher risk of respiratory failure
- Depression
- Higher risk of complications after surgery
- Higher risk of hypothermia-abnormally low body temperature

- Higher healing times for wounds
- Longer recover times from infections
- Longer recovery from illness
- Lower sex drive
- Problem with fertility
- Tiredness, fatigue or apathy
- Skin may become thin, dry, inelastic, pale and cold
- Weakness in teeth
- Eyes become sore and eyesight problems
- Hair becomes dry and sparse, falling out easily.

3.5.1 Causes of Malnutrition

There are many causes for malnutrition. These causes can be divided in two main categories:

1. Causes related to food.
2. General Causes.

1. Causes Related to Food: A lot of causes related to food are responsible for malnutrition.

a) Lack of Nutrition's and Balanced Diet: Lack of nutrition's an balanced diet is responsible to a great extent for malnutrition in children. In our country, because of poverty, there is a lack of essential elements like proteins, carbohydrates, fats etc. In everyday meal; hence, manifestation of malnutrition in children is nurtured.

b) Indigestive and Harmful Diet: Intake of indigestive and harmful diet is one of the main causes of malnutrition. Children belonging to the rich families do have expensive food items but in general these food items are indigestive and harmful. Intake of such type of food items often leads to lack of hunger and hence sometimes the children fall prey to malnutrition.

c) Lack of Regulated Diet: Irregular intake of food is one of the main causes leading to malnutrition. The timing for breakfast, lunch and dinner must more or less be fixed. Indiscipline in this matter is very bad. This bad habit of taking irregular meals causes indigestion and finally results in malnutrition.

d) Lack of Breastfeeding: Experts say that lack of breast-feeding, especially in the developing world, leads to malnutrition in infants and children. In some parts of the world mother still believe that bottle feeding is better for the child. Another reason for lack of breastfeeding, mainly in the developing world, is that mothers abandon it because they do not know how to get their baby to latch on properly, or suffer pain and discomfort.

2. General Causes

a) Dirty Environment: Dirty environment of home and school also causes malnutrition in Indian cities the home and school environment becomes dirty due to lack of fresh and pure air, lack of sunlight, non availability of playground, dirty lanes, which hampers right nutrition of children.

The children working in glass factories, leather industry, brick industry etc. Face the kind of dirty, unhygienic and unhealthy environment, which is hard to imagine hence child labour must also be completely banned so as to avoid the children from such filthy environment.

- b) **Lack of Sound Sleep and Rest:** Lack of space and suffocated bedroom causes lack of sleep. Besides this excess of homework. Television watching in late hours causes lack of sleep result in indigestion, which leads to malnutrition. Lack of proper and sufficient rest also leads to malnutrition.
- c) **Negligence of Children:** Negligence of children at home and in school causes anxiety in children. This also result in malnutrition.
- d) **Bodily Diseases:** Many children being infected from the diseases are neither able to have balanced diet nor their bodily function take place properly resulting in malnutrition.
- e) **Heavy Work:** The digestive process of children gets affected because of continuous hard work. Especially for the children of low income-groups, the heavy labour uncoupled diet take a toll on their physical and mental development. Nearly forty percent of total children in India suffer from malnutrition.
- f) **Lack of Exercise and Games:** The lack of exercise and games also leads to malnutrition. Even if a child takes a balanced and nutrition diet, the lack of exercise and games resulting in showing down of digestive process and consequently the food is not digested properly causing malnutrition. This also causes physical deficiencies.

3.5.2 Remedies of Malnutrition

1. Punctually is the most important remedy so that we should take our meals punctually.
2. Always take balanced diet. In this diet we must add variety of foods.
3. Food should be easily digestible and nutritious.
4. Spread awareness programme among females regarding the importance of breastfeeding.
5. The home and school environment must be neat and clean as possible.
6. Arrangements should be made for the medical examination of each student at least once in a year.
7. Regular exercise as well as games, both are very essential for every individual.

3.6 SUGGESTED QUESTIONS

1. Explain the anatomy and hormones of the hypothalamus
2. Explain the anatomy and hormones of the pineal gland and its functions.

3.7 BOOKS RECOMMENDED

1. The World Bank Policy Research Department, Poverty and Human Resources Division.
2. Agarwal, D. K., Upadhyay, S. K., Tripathi, A. M., Agarwal, K. N. (1987). Nutritional Status, Physical Work Capacity and Mental Function in School Children. Nutrition Foundation of India, Scientific Report 6.
3. Brahmam, G. N. V. (2003). Evaluation of Mid Day Meal Programme in the States of Andhra Pradesh, Karnataka, Orissa, Tamil Nadu, Kerala, and Gujarat. Paper presented at a workshop on mid-day meal programme in schools in India convened by the Nutrition Foundation of India, New Delhi, August, 1.

**COMMON CHILDHOOD ILLNESSES: CAUSES AND PREVENTION; IMMUNIZATION
STRUCTURE**

- 4.1 Introduction
- 4.2 Some Important Childhood Diseases
 - 4.2.1 Measles
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4.1 INTRODUCTION

Preservation and strengthening of the childhood health is a major challenge in the modern world. Currently, the world is under new threat that is caused by unprecedented, unrestrained new disease outbreak. These diseases have become a major cause of death as well as began to threaten the survival of mankind. Millions of children in developing countries dies due lack of medical care this not only effect the families but a big loss to the nations.

4.2 SOME IMPORTANT CHILDHOOD DISEASES

Some important childhood diseases are as follows:

4.2.1 Measles

Measles is one of the leading cause of death among young children. Even though a safe a cost-effective vaccine is available in 2011, there were 1,58,000 people

died from measles in it. About 430 deaths every day and is death every hour. More than 95% of measles deaths occurs in low-income countries with weak health infrastructure.

⇒ **Cause**

Measles is a highly contagious, serious disease caused by a virus in the paramyxovirus family, that normally grows in the cells that line the back of throat and lungs.

⇒ **Signs and Symptoms:**

The first sign of measles is usually a high fever, which begins about 10 to 12 days after exposure to the virus and last 4 to 7 days.

- Runny nose
- Red and heatery eyes
- Small white spots inside the cheeks
- Cough problem
- A rash erupts usually on the face and upper neck. Over about 3 days, the rash spreads and reaching the hands and feets. The rash lasts 5 to 6 days and then fades. On average, the rash occurs 14 days after exposure to virus.

⇒ **Mode of Spread:**

The highly contagious virus is spread by coughing and sneezing. Close personal contact or direct contact with infected nasal or throat secretions.

⇒ **Treatment**

1. If the fever goes very high, cold sponging should be done.
2. Keep the patient warm in a dark room.
3. Good nutrition and adequate fluid intake.
4. ORS (Oral Rehydration Solution) recommended by WHO.
5. Vitamin 'A' supplements.
6. To relieve itching an application with carbolated Vaseline will be effective.

⇒ **Preventions**

1. Proper vaccination of all new born at 3-9 months.
2. Use of measles vaccine or routine Measles vaccination for children. For example: MMR (Measles Mumps Rubella) or MMRV (Measles, Mumps, Rubella and Varicella or chicken pox).
3. No person from the infected house should attend school or office.

4.2.2 Chicken Pox

Chickenpox is a highly communicable viral disease which affect almost all children from 3-10 years of age. Mostly it occurs in winter season. It can be more serious in newborn babies and in adults. Its rashes usually begins as small lumps that turn into blisters and will dry, crust over and form scabs eventually.

Though chickenpox is mostly a mild disorder in childhood some people are at risk of serious complications from chickenpox like:- The unborn foetus of a pregnant woman who develops chickenpox, neonates any person with a weekend immune system etc.

⇒ **Cause:**

It is caused by a specific varicella zoster virus (VZV).

⇒ **Sign and Symptoms:**

Sudden onset of slight fever

- Feeling of tiredness and weakness.
- Itching and rashes starting on the scalp and face.
- Watery fluid starts appearing in these blister, then it turns yellowish.

⇒ **Mode of Spread:**

Chickenpox is transmitted from person to person by direct contact like touching the rash, through droplet or air born spread like through sneezing and coughing. It could also transmit indirectly through articles of that particular person also.

⇒ **Treatment:**

Though its infectious usually resolves without any treatment. However when there are some complications then we need proper medical advice.

1. Keep finger nails of patient trimmed short to avoid scratching.
2. Use calamine lotion.
3. Aspirin or aspirin – Containing products should not be taken to relieve fever.
4. Non-aspirin medications such as acetaminophen should be used.

⇒ **Preventions**

1. A patient should wear clean clothes.
2. A child suffering from this diseases should be given light diet.
3. Patient should segregated from others.
4. Proper treatment of skin.
5. Injection of varicella zoster immune globulin within 3 days of exposure can cause temporary protections of non-immune individuals.
6. Patient should avoid public places until the blusters are dry crusted.

4.2.3 Smallpox

Smallpox stands eliminated from the world. This is a very serious infectious disease. This disease is also known by the Latin names 'Variola' or 'variola Vera' derived from variolus (means spotted) or variolus (pimple). The term "Smallpox was first used in Great Britain in 15th century its last case was dragnessed on 26th October 1977".

⇒ **Cause:**

Smallpox was an infectious disease, caused by two, virus variants like 'varrole major' and 'Variola Minor'.

⇒ **Sign and Symptoms**

1. Severe headache
2. High fever (40°C / 104°F)
3. Severe Backache
4. Vomiting
5. On 3rd day or so fever falls and rash appears which is seen on face and extremities including palms and soles
6. Dark red spots
7. On 13-15 days scabs are formed which fall off leaving pitted scars with disfigurement.

⇒ **Mode of Spread:**

It spreads through a virus named Vriola virus a species of Orthopoxvirus infection usually occurred via the respiratory tract (droplet spread) or skin inoculation.

⇒ **Treatment**

1. Keep the patient in a dark room
2. Give liquid diet to patient
3. Cold sponging should be done if the temperature goes very high
4. To relieve itching, carbolated vaselin will be effective.

⇒ **Prevention**

1. Patient should segregate from others.
2. Avoid public places like school, markets etc.
3. Proper vaccination of all new born at 3-9 months.
4. To intimate about the infection report to the health officer.
5. Do not allow any child to come to school if spot is seen on his face or arms.
6. Keep the normal child away from the infected home.
7. Complete rest.
8. Keep the child under observations.

4.2.4 Whooping Cough (Pestussis)

The other name of whooping cough is pertussis. This is a very serious infectious respiratory disease. It can affect all age groups but most commonly in children. For eg: in adolescents and adults symptoms are usually wild, while in children less than 01 year of age symptoms can be particularly severe. Whooping cough affects female more commonly than males, though the reason for this is not fully understood.

⇒ **Causes:**

Whooping cough is caused by bacteria called Bordtella pertussis.

⇒ **Sign and Symptoms**

1. It starts like a cold, with congestion and upper respiratory symptoms and then progress to a cough.
2. Sneezing and fever.
3. The eyes may get red and the child seems to have ordinary cough.
4. After 2 weeks the cough increases and become paroxysmal.
5. During the fit, the face of the child turns blue due to the continuity of cough.

⇒ **Mode of Spread:**

It spreads through close contact with oral secretions or respiratory droplets it is easily spread through the cough and sneezes.

⇒ **Treatment**

1. Keep the patient warm in bed but plenty of fresh air should come in the room.
2. Proper bed rest.
3. Small frequent meals.
4. Maintaining fluid intake.
5. Use of Antibiotics specially Erythromycin.

⇒ **Preventions**

1. Immunization is essential against whooping cough for this purpose, immunization against whooping cough is given free to children as a part of national immunization schedule.
2. Total 3 doses for children.

4.2.5 Influenza

It is an Italian word meaning influence. People who contact influenza are most ineffective between the second and third days after infection.

⇒ **Cause:**

Influenza is caused by a group of virus.

⇒ **Sign and Symptoms**

1. Sore throat
2. Weakness
3. Pain in body
4. Headache
5. Fever
6. Sneezing due to irritation of nose
7. Harsh cough

⇒ **Mode of Spread:**

Influenza can be spread by three main ways:

- By direct transmission (When an infected person sneezes mucus directly into the eyes, nose or mouth of another person).
- The airborne route when some inhales the aerosol produced by an infected person through cough, sneezing or spitting.
- Though hand-to-Eye, hand-to-nose or through hand-to-mouth transmission or from direct personal contact such as hand-shake.

⇒ **Treatment**

- Give liquid diet.
- Room temperature must warm.
- Use face masks.
- Alcohol is an effective sanitizer against influenza viruses.
- For headache – fever crocine tablet can give relief to patient.

⇒ **Precautions**

Who (World Health Organizations) recommendations are as follows:

1. Get yourself vaccinated against current strains of influenza if possible.
2. Do not send the children to school.
3. Reduce the time spent in crowded places.
4. Practice good health habits.
5. Keep your distance from people who show symptoms of influenza. So try to maintain a distance of about 1 metre if possible.
6. Avoid touching your mouth, nose and eyes as much as possible.
7. Improve air flow in your living space by opening windows.

4.2.6 Malaria

Malaria is a mosquito – borne infectious disease of human. It is a very common problem in our country it spreads quickly from a sick person through female Mosquito which bites the human being at sunset or at night and sucks blood along with the malaria parasites which are present in the sick person.

⇒ **Cause:**

It begins with a bite from an infected female Anopheles mosquito, which introduces the parasites through saliva into the circulatory system.

⇒ **Signs and Symptom**

1. Fever problem
2. Headache (In severe case can progress to coma or death)
3. Shivering
4. Excessive weakness
5. Joint pain
6. Vomiting problem
7. Anemia etc.

⇒ Classical Symptoms:

The classical symptoms of Malaria is paroxysm a cyclical occurrence of sudden coldness followed by rigor and then fever and sweating, occurring every two days.

⇒ Mode of Spread:

Malaria is transmitted by the bite of an infected female anopheles Mosquito. In rural areas hygienic conditions are not good do the ill – Ventilated and ill – lit houses provides ideal indoor resting places for Mosquitoes.

⇒ Treatment

1. Give light liquid diet to patient
2. Choloquine may be used where the parasite is still sensitive
3. When the temperature rises above 104°F reduce it with cold sponging on patient's head.
4. Give paracetamol or aspirin to patient.

⇒ Precautions:

Many researches shows that the Malaria prevention is much more cost-effective than the treatment. There is a wide disparity in the costs of control and elimination programmes between different countries we can clear it with the help of an example. For example, in China – Government announced (2010) a strategy to Eliminate the Malaria in Chinese provinces but the required investment is a small portion of public Expenditure on health. In contrast a same programme was launched by the Tanzanian government and the government used one-fifth of the public health budget.

1. Use D.D.T powder on suspicious places.
2. Use one tablet of quinine in a week where Malaria spreads.
3. Don't collect water on open places.
4. Use odomos and other tubes. As a medicine on open body parts like arms, legs etc.
5. Mosquito net should be used every night.
6. Use kerosene oil in standing water.
7. The pits should be filled up before the rainy season.

4.2.7 Diphtheria

Diphtheria is a very serious infectious disease that primarily affects the mucous membranes of the respiratory tract although it may also affect the skin and lining tissues in the Ear, Eye and the genital areas.

Most recently in the year of 1990, large outbreaks of diphtheria bacterium was first identified in the year of 1880.

⇒ Cause:

It is caused by a bacillus corynebacterium diphtheria. It attacks younger children between the age group from 2-5 years.

⇒ **Sign and Symptoms**

1. Sore throat
2. Fever
3. Hoarseness
4. Difficulty in breathing
5. Muscle weakness (related to skin)
6. The neck gets swollen and there is watery discharge from the nose.

⇒ **Mode of Spread:**

Diphtheria is transmitted to close contact via airborne respiratory droplets. Rarely it can be spread by objects contaminated by an infected person. Along with these reasons, overcrowding and poor living conditions can further contribute to its spread.

⇒ **Treatment**

1. The patient should be segregated from others.
2. Diphtheria antitoxin is mainstay of therapy. It neutralizes circulating diphtheria toxin and reduce the progression of the disease.
3. Use Penicillin and Erythromycin antibiotics.

⇒ **Preventions**

1. Its prevention can be possible through universal immunization with diphtheria toxoid containing vaccines.
2. Travelers to areas where diphtheria is Endemic should review and update their Vaccinations.

4.2.8 Tuberculosis (TB)

Tuberculosis is a highly communicable disease. If tuberculosis is not treated in a proper way then it can be fatal approximately one-third of the world's population is infected with tuberculosis bacteria. More than 1 million become sick with tuberculosis disease annually.

⇒ **Cause:**

Tuberculosis is caused by bacteria (Germs) that attacks the lungs or other parts of the body such as kidney, spine or brain.

⇒ **Sign and Symptoms**

1. Light fever
2. Coughing
3. Pain in chest and throat
4. In some case, blood also comes with sputum
5. Loss of weight
6. Rapid pulse etc.

⇒ Mode of Spread:

Its two major sources are: Infected sputum and infected meat and milk.

When the sputum dries up then tubercle bacilli are scattered in dust. The bacilli spreads persons to person through the air when a person with active tuberculosis coughs or sneezes then its bacteria's get in the air. Anyone who has close and frequent contact with a person with active tuberculosis disease can breathe in the bacteria and becomes infected.

TB is not spread by shaking some one's hand shaking food or drink, touching bed linens or toilet seats or Kissing's etc.

⇒ Treatment

1. Patient should be kept away from others.
2. Places should be neat and clean.
3. Sputum and excreta of the patient should be burnt.
4. Contact to Distt. Tuberculosis office.
5. Patient should take medicine 1 to 1^{1/2} years as advised. Usually patient feels better after 3 months and leaves medicines and is not cured completely.

⇒ Precautions

1. BCG vaccination to a child from birth to 19 years of age.
2. Improving environmental conditions.
3. Proper balanced diet.
4. Morning and evening walks.
5. Proper ventilation in homes.
6. Knowledge about DOTS system should be given at every stage of education.

4.2.9 AIDS

Aids stands for Acquired Immune Deficiency Syndrome. It was first time identified in the Early 1980 in North America. Today, there are an estimated 34 million people living with HIV Aids. HIV infections are also increasing among women.

⇒ Cause:

It spreads with the help of virus is found in African Green Monkeys. A large number of African people migrated to different parts of the world.

HIV virus attacks immune system cells and damage these cells HIV has damaged the immune system enough for AIDS to develop.

⇒ Sign and Symptoms:

Symptoms and signs of HIV infection appear 2 to 12 weeks after Exposure. The symptoms of this phase are flu-like.

1. Diarrhea
2. Fatigue or Weakness
3. Joint pain

4. Rashes on body parts
5. Weight loss
6. Persistent cough
7. Yeast infections (of the mouth or vagina)
8. Itching on skin
9. Night sweats
10. Headache etc.

⇒ **Mode of Spread:**

HIV spreads only through the exchange of certain body fluids – Most commonly, semen and blood. These fluids can be exchanged during a variety of activities.

However, the 3 activities in which they are most commonly passed in amounts large enough to transmit the virus are sex, blood transfusions and the sharing of needles by intravenous drug users.

⇒ **Treatment**

1. HIV is usually treated with HAART (Highly active Antiretroviral Therapy), medications. HAART can reduce the amount of virus in the blood, improve the immune system and can slow the progress of the disease.
2. It is very important to take the medicines exactly as prescribed by the doctor.
3. Due to latest researches, a patient can contact to the (ATIE (The Canadian AIDS Treatment Information Exchange)).

⇒ **Preventions**

1. Using Condoms during sex.
2. Not sharing needles etc.

4.2.10 H1N1 (SWINE) Flue 2009

H1N1 (Swine) Flue is an infectious disease and commonly referred to as swine influenza or pig flu. Swine influenza is common in the pig population worldwide. The centre for disease control and prevention (CDC) has found that this variant strain of swine flu (H1N1) can infect humans, spread from human to human and cause illness. At this time it is not known how easily the virus spreads.

⇒ **Causes:**

Mainly Swine Flu occurs only as a result of H1N1 virus but it is important to know that influenza virus change, on a constant basis to produce many strains and swine flu is caused due to one such strain while some strains of virus infect birds, pigs and humans and some strains infect pigs only.

⇒ **Sign and Symptoms:**

Swine Flu Symptoms are similar to regular flu

1. Fever

2. Cough
3. Sore throat
4. Body aches
5. Headache
6. Fatigue
7. Vomiting Diarrhea etc.

⇒ **Mode of Spread:**

Swine Flue is spread just like the regular seasonal flue spreads it goes from one person to another person through close contact and through direct touch, indirect touch or respiratory droplets carrying the virus from person to person it can occur through coughs and sneezes.

For example:

If you touch an infected person then you will most likely pick up the virus and get the swine flue.

⇒ **Treatment**

1. Protect yourself with the help of flue vaccination.
2. Use antiviral drugs like Tamiflu and Relenza etc.
3. Antibacterial therapy.

⇒ **Preventions**

1. Proper and frequent hand washing.
2. Use of hand sanitizer with atleast 60% alcohol content
3. Avoid touching your face, eyes, nose and mouth.
4. Always use warm water for 15-20 seconds especially after you cough and sneeze.
5. Try to avoid close contact of sick person.
6. Avoid crowded places.
7. Stay home from work or school if you get sick with the flu.

4.2.11 Mumps

Mumps is an extremely contagious viral infection of the salivary glands that most commonly affects children. The most obvious symptom is swelling of one or both of the salivary glands on the sides of the face.

⇒ **Mode of Spread**

Mumps is a contagious disease caused by a virus that passes from one person to another through saliva, nasal secretions, and close personal contact.

⇒ Symptoms

Symptoms of mumps usually appear within two weeks of exposure to the virus. Flu-like symptoms may be the first to appear, including:

- Fatigue
- Body aches
- Headache
- Loss of appetite
- Low-grade fever

⇒ Treatment

Because mumps is a virus, it doesn't respond to antibiotics or other medications. However, you can treat the symptoms to make yourself more comfortable while you're sick.

Rest when you feel weak or tired.

Take over-the-counter pain relievers, such as acetaminophen and ibuprofen, to bring down your fever.

Drink plenty of fluids to avoid dehydration due to fever.

Eat a soft diet of soup, yogurt, and other foods that aren't hard to chew (chewing may be painful when your glands are swollen).

Avoid acidic foods and beverages that may cause more pain in your salivary glands.

⇒ Prevention:

Vaccination can prevent mumps. Most infants and children receive a vaccine for measles, mumps, and rubella (MMR) at the same time. The first MMR shot is generally given between the ages of 12 and 15 months at a routine well-child visit. A second vaccination is necessary for school-aged children between 4 and 6 years old.

4.2.12 Cholera

Cholera is an infectious disease that causes severe watery diarrhea, which can lead to dehydration and even death if untreated. Cholera is an intestinal infection caused by *Vibrio cholerae* it is transmitted by the fecal-oral route.

⇒ Incubation Period:

Period is from few hours to few days.

⇒ Common Symptoms of Cholera include:

- Sudden onset of diarrhea
- Nausea
- Vomiting
- Mild to severe dehydration

⇒ **Prevention**

- Wash your hands
- Drink only bottled or boiled water
- Avoid raw food and shellfish
- Avoid dairy foods
- Eat raw fruits and vegetables that you can peel yourself.

⇒ **Treatment**

- Oral rehydration salts
- Intravenous fluid rehydration
- Antibiotics
- Zinc supplements

4.2.13 Scabies

Scabies is a skin infestation caused by a very tiny mite known as the *Sarcoptes scabiei*. These microscopic mites can live on your skin for up to two months. They reproduce on the surface of your skin and then burrow into your skin and lay eggs. This causes a very itchy, pimple-like rash to form on the skin.

⇒ **Scabies may be spread in the following ways:**

- Prolonged skin-to-skin contact, such as holding hands
- Intimate personal contact, such as having sexual intercourse
- Sharing clothing, bedding, or towels that have been used by someone with a scabies infection.

⇒ **Symptoms of Scabies**

1. **Itching:** This is often worse at night and can be severe and intense. Itching is one of the most common symptoms experienced in scabies.
2. **Rash:** When the mite burrows into the skin, it forms burrow tracks, or lines, which are most commonly found in skin folds and resemble hives, bites, knots, pimples, or patches of scaly skin. Blisters may also be present.
3. **Sores:** These occur in infested areas where a person has scratched at the skin. Open sores can lead to impetigo, commonly caused by secondary infection with *Staphylococcus aureus*.
4. **Thick crusts:** Crusted scabies, also known as Norwegian scabies, is a form of severe scabies in which hundreds to thousands of mites and mite eggs are harbored within skin crusts, causing severe skin symptoms.

⇒ **Precautions:**

Isolation of the patient is necessary all his clothes be washed with hot water having 122°F temperature.

⇒ Treatment:

Treatment for scabies usually involves getting rid of the infestation with prescription ointments, creams, and lotions that can be applied to the skin directly. Your doctor will probably instruct you to apply the medicine at night when the mites are most active.

4.2.14 POLIO

Poliomyelitis (polio) is a highly infectious viral disease, which mainly affects young children. The virus is transmitted by person-to-person spread mainly through the faecal-oral route or, less frequently, by a common vehicle (e.g. contaminated water or food) and multiplies in the intestine, from where it can invade the nervous system and can cause paralysis.

⇒ Symptoms

- Fever
- Sore throat
- Headache
- Vomiting
- Fatigue
- Meningiti
- Loss of reflexes
- Severe spasms and muscle pain
- Loose and floppy limbs, sometimes on just one side of the body
- Sudden paralysis, temporary or permanent
- Deformed limbs, especially the hips, ankles and feet.

⇒ Prevention

The best way to prevent polio is to get the vaccination. Children should get polio shots according to the vaccination schedule.

⇒ Treatment

There is no cure for polio once a person becomes infected. Therefore, treatments are focused on increasing comfort, managing symptoms, and preventing complications. This can include providing bed rest, antibiotics for additional infections, pain killers, ventilators to help breathing, physiotherapy and moderate exercise and a proper diet.

Role of School in the Matters of Common Diseases

1. Awareness programmes should be launched.
2. Soap and disposable towels or other hand-draying devices must be available at all hand washing skills.
3. Sanitary napkin disposal must be provided for girls of age ten or older and in teachers toilet rooms.

4. The school must provide sanitary napkin dispensers.
5. If a child develops symptoms of illness while at school, then isolate the child immediately from other children and inform their parents or guardians as soon as possible.
6. Smoking must be prohibited during school hours in rooms and other areas used by children.
7. School officials should also be aware of the need to comply with the laws and rules relating to the immunization of children proper assessment of students health.

4.3 IMMUNIZATION

According to WHO Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease. Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and is estimated to avert between 2 and 3 million deaths each year. It is one of the most cost-effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations. Immunization is mostly done through vaccination or through oral route (BCG injection and polio drops etc).

4.3.1 Importance of Immunization

- Immunizations can save your child's life
- Vaccination is very safe and effective
- Immunization protects others you care about
- Immunizations can save your family time and money
- Immunization protects future generations
- Immunization helps in erratic some diseases.

Vaccination	Age
BCG and Oral Polio	At Birth
Oral Polio and DPT + Hepatitis B	1.5 Months
Oral Polio and DPT + Hepatitis B	2.5 Months
Oral Polio and DPT + Hepatitis B	3.5 Months
Meales	9 to 12 Months
Booster Doses DPT and Oral Polio	1.5 to 2 Years DT 5 Years
Tetanus Toxioid	10 Years
Tetanus Toxioid	16 Years
Vitamin – A	9, 18, 24, 30 and 36 Months

4.4 SUGGESTED QUESTIONS

1. What do you mean by nutrition and explain the components of balance diet?

2. Explain in detail the components of balance diet its source and their functions.

4.5 BOOKS RECOMMENDED

1. Chandler, A. M. K. Walker, S. P., Connolly, K., Grantham-McGrenor, S. M. (1995). School Breakfast Improves Verbal Fluency in Undernourished Jamaican Children. *Journal of Nutrition*, 125(4), 894-900.
2. Dreze, Jean & Aparajita Goyal (2003). Future of Mid-Day Meals, *Economic and Political Weekly*, November 4673-4683 (special articles).