UNIT 3 : THE NERVOUS SYSTEM AND THE BRAIN

UNIT STRUCTURE

3.1 Learning Objectives

3.2 Introduction

3.3 The Nervous System

3.4 The Brain

3.5 Let Us Sum Up

3.6 Further Readings

3.7 Answers To Check Your Progress

3.8 Model Questions

3.1 LEARNING OBJECTIVES

After going through this unit, you will able to-

- describe about the nervous system
- know about the brain.

3.2 INTRODUCTION

It is the third unit of this course. At the very begining you will know about a very important system of human body, the nervous system. Moreover, analysis has been made of the Brain, the principal controling organ of nervous system in this chapter.

Human body is constituted of some organ systems. All biological functions are carried out by these organ systems in our body. It is important to have knowledge about the organ systems of human body for each and every medical courses. Medical literature of different coutries of the world have described the human organ systems in different ways. Ancient Indian medical literature, Ayurveda also include the description of human organ systems. Allopathy gives a complete scientific description of human organ system. In this chapter description of various organ systems are given on the basis of bio-medical science.

3.3 THE NERVOUS SYSTEM

Nervous system is one of the different systems of the human body. All kinds of sensation and control and co-ordination of the different organ-systems are done by the nervous system. The nervous system of human being is divided into two parts. One is the central nervous system (CNS) and the other is peripheral nervous system (PNS). The central nervous system is constituted of the brain, spinal cord and brain stem. PNS comprises of the nerves concerned/connected with the different parts of the body. These nerves are connected with the spinal cord and the brain stem.

12 pairs of cranial nerves arise from the brain stem, situated just below the brain. These nerves directly connect the various organs of our body. These nerves are mainly connected to the different parts of our face. Human skin and muscle tissues are connected with 21 pairs of nerves which arise from the spinal cord. These nerves carry the sense from various organs to brain as impulse & brain send the nerve impulse as response to the organs. The principal cranial nerves that emerge out from the brainstem are – Olfactory nerve, oculomotor nerve, facial nerve, vestibulocochlear nerve, glossopharyngeal nerve, Vagus nerve etc. 31 pairs of nerves which emerge out from spinal cord get spread to the various organs of our body. These nerves can be devided in 5 divisions, depending on their location, 4 pairs from cervical plexus, 12 pairs from thoracic region, 5 from lumber region, 5 from saeral region and from occcygeal region. These nerves extend to the different parts of the body.

Cranial nerves control the voluntary functions such as locomotion, vision, hearing etc. of our body. On the other hand autonomic nervous system control the function of heart, kidney, alimentary canal, lung etc. These nerves help in the maintenance of internal homeostasis of our body. Decrease in heart beatrate beat, blood pressure and blood sugar etc activate the autonomic nerves and provide energy to body for fighting against the situation. The principal function of these nerves is to send impulse or nerve impulse.

Human body transmit each type of impulse, may be internal or external, with the help of the arrangement called nervous system. Nerve cells or neurons control all the physiological functions. Co-ordination among the various organ systems and relation between the body with environment etc are carried out by the neurons. Brain is the main organ of nervous system. All sense of the body are sent to the brain by the nerves and brain gives the respond to different parts of the body. As for example nerve impulse move our hand if it touches fire. Thus in every situation it save oyr body from incidents.



CHECK YOUR PROGRESS

Q 1: Fill in the blanks :

(a) Nerves are joined with .....
and .....

(b) ..... and spinal cord control the voluntary functions.

(c) Neurons control the ..... functions.

3.4 THE BRAIN

Human brain is situated in the head. It remain safe iside a skull. Brain conserves the nerve impulses. The volume and weight of an adult brain is 1500 cc and 1.36 kg respectively. Brain and the spinal cord are covered by special type of nerve coverings. The cover is known as meninges. It is consist of three layers. The outermost layer is called duramater, middle one is caalled arachnoid and the innermost is called piamater. There are 10,000 million neurons in human brain. Nerve tissues of brain are of two types. Nervous tissues of the outer part is called grey matter and the same of the inner part is called white matter. The brain has three main divisions. Front section is called forebrain, middle section is called Midbrain and the last part is called Hindbrain. There are three lobes in the front part. They are olfactory lobe, cerebral hemisphere and dienosephalon. The function of the olfactory lobe is to produce smell sensation. There are many divisions of cerebral hemisphere. The functions

of these divisions are to receive sensation or impulse from the sensory organs, to control the muscle movement, locomotion and all type of sense, memory, intelligence, speech, thinking etc. Moreover it controls and receives the sense of touch, pain and taste. One part control the power of vision and hearing also.

There are two divisions of diencephalon. One is thalamus and the other one is hypothalamus. Thalamus send the sensation of pain, heat, touch, any stimulus from any organ to the brain. Hypothalamus mainly control hunges, thirst and other emotions. Pituitary gland is situated in this part. Pituitary gland controls the entire endocrine glands.

Optic lobe is located in the midbrain. This part is mainly responsible for receiving the sense of vision.

Hindbrain comprises cerebellum, medulla oblongata and pons verolli. Cerebellum controls the voluntary muscles and maintain the power of body. Medulla oblongata controls the involuntary muscles, heart beat, contraction of blood vessels, secretion of saliva, cough, vomiting, urination, food intake, contraction of intestine, defecation etc.

Pons vorelli is a fibre tract. It interconnect different regions of the brain and carry stimulus from cerebral hemespheres to the other regions.

Spinal Cord : It passes through the vertebral column starting from medulla obtongata to the lumber column. The cord has two enlargements, cerrical and lumber.

Vertebral column is comprised of 31 parts. From each part a pair of nerve emerge out. This means spinal cord protrude out 31 pairs nerves. These nerves recieve different stimulus from the various organs.

Cranial nerves : There are 12 pairs of cranial nerves in human body. The functions of these nerves are as listed below.

Sl. No.	Cranial nerves	Source	Functions
1.	Olfactory nerve	Epithelial tissue of nose	Sense of smell
2.	Optic nerve	Retina	Sense of vision

3.	Oculomotor nerve	Muscle of eyeball, efferent nerve of midbrain, visual nerve centre.	Sense of muscular stretch
4.	Trocchtear nerve	Afferent nerve, muscle of eyeball, motor neuron, eye ball nerve centre at midbrain.	Sense of muscle stretching
5.	Trigeminal	Afferent nerve is divided into three branches opthelmic, maxillary and mandibular nerves. Source - Eye ball, face, nerve centre lies on the moter neuron of midbrain.	Sense of pain, pressure, touch and muscular stretching
6.	Abdusens	Afferent nerve, muscle of eye ball, motor neurons, eye contracting nerve centre at pons.	Sense of the muscular stretching of eyeball.
7.	Facial	Afferent nerves, tast buds external ear, middle ear facial muscle, tear glands.	Sense of the facial skin and taste.
8.	Vestibulocochlear	Vestibular recipient in the inner ear, and recipient at labyrynth.	Enable hearing and mediate balance & motion.
9.	Glossopharyngeal	Mucus layer of epiglottis, afferent nerve of tongue tonsil & motor neurons.	Taste, provide muscle stretch feeding, saliva secretion.
10.	Vagus	Afferent nerves, receptors of chest and abdomen cavity.	Control of voice box, lung, heart, stomach and intestine with

			their secretion.
11.	Accessory	Medula obolongata	Movement of head and sholdier.
12.	Hypoglossal	Hypoglossal nerve centre at medulla abolongata.	Movement of tongue.



CHECK YOUR PROGRESS

Q 1: What is the volume of an adult brain ?

.....

.....

Q 2: What are the frontal part of brain ?

.....

.....

Q 3: How many cranial nervs are there in human body ?

.....

Disorders of nerves :

Different reasons are there behind the abnormalities of the nervous system. Diseases of nerves are due to these abnormalities. Patient become unconsious and faint due to epilepsy, head injury or infection on nerve cells of the brain. The main cavse of taintreass is nervediscase. Level of nerve disorder depends an the physical and mental status of the patient. In sufficient supply of blood to the brain also cause nerve disorders. Irregular blood flow to the brain causes headache, senselessness and different types of disorders of the nerves. Visual imbalance, facial imbalance and imbalance of different organs and brain are the main disorders of nervous system.

All persons may suffer from nervous disorders at any time. Doctors say that nerve disorders like epilapsy, muschlar weakness etc. are genetic disorders.

The primary and principal symptoms of nerve disease are – headache, vibration of limbs, fainting, becoming unconscious and losing

balance of the body.

According to allopathy various nerve disorders are. Bell's palsy, Brain abscess, Brain tumour, Cataplexy, Cervical Rib syndrom, Headache, Delerium, Dimentia, Encephalities, Hematoma, Epilepsy, Migrain, Multiple - sclerosis, Muscular distrophy, Neuraglia, Parkinson's disease, polyneuropathy, stoke, Tension, Trigeminal neuroglia, Vertigo etc.



3.5 LET US SUM UP

- Human body is comprises of various organ systems. All metabolic and biological functions of human body are carried out by these organ systems.
- Nervous system is the principal organ system of human body. Control and co-ordination of various organ system along with each type of sensation are carried out by the nervous system.
- The principal cranial nerves which arise from brain stem and run to various organs are– olfactory, occulomotor, abducens, facial, vestibulococchlear, glossepharyngeal, vegas nerve etc.
- Cranial and peripheral nerve control our voluntary functions such as– motion/movement, hearing, vision etc. On the other hand autonomic nervous system control the function of heart, kidney, alimentary canal, lung etc. Internal homeostasis is maintained by autonomic nerves.
- Human brain is situated in the brain. It remain safe inside a skull Nerve impulse remain safe in human brain. The volume and weight of an adult brain is 1500 cc and 1.36 kg respectively.
- Forebrain has three divisions. They are - Olfactory lobe, cerebral hemespheres and diancephalon. The sense of smell is produced by olfactory lobe.
- Different abnormalities of nervous system occures due to different reasons. These abnormalities create nerve diseases. Principal

symptoms of nerve disease are – headache, vibration of organs, numbness, senseless, imbalance of the body.



3.6 FURTHER READINGS

1) 'Nesvous System - Human body. Pegasus.

2) 'Glenco Science - Human body System, Mc Graw-Hill/Glenco.



3.7 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Volumn 1500cc and weight is 1.36 kg.

Ans to Q No 2: Olfactory lobe, cerebral hemesphere, diencrephalon.

Ans to Q No 3: 12 pairs.



3.8 MODEL QUESTIONS

Q 1: What is nervous system ?

Q 2: How many diviosions are there in nervous system ?

Q 3: What are the central part ?

Q 4: What are the divisions of brain ?

Q 5: Write the names of a few cranial nerves.

Q 6: Describe the structure of neuron or nerve cell.

Q 7: What is nerve fibre ?

Q 8: Write a few names of nerve disorders.

*** ***** ***