PHYSIOLOGY ASSIGNMENT.

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1. PHYSIOLOGY OF SLEEP.

Sleep is the natural periodic state of rest for mind and body with closed eyes characterized by partial or complete loss of consciousness. Depth of sleep is not constant throughout the sleeping period. It varies in different stages of sleep.

Physiological changes during sleep.

* The plasma volume decreases about 10% during sleep.
* Heart rate reduces.
* Systolic pressure falls to about 90-110mmHg
* Rate and force of respiration are decreased.
* Formation of urine decreases and specific gravity of urine increases
* Tone in all the muscles of body except ocular muscles decreases very much
* Lacrimal secretion decrease.

TYPES OF SLEEP:

* RAPID EYE MOVEMENT (REM)

It is the type of sleep associated with rapid conjugated movement of the eyeballs, which occur frequently. It is also called **paradoxical sleep**. It occupies about 20-30% of sleeping period. It plays a role in consolidation of memory. Dreams occur during this period.

During REM sleep, electroencephalogram (EEG) shows irregular waves with high frequency and low amplitude. These waves are **desynchronized waves**.

* Non-rapid eye movement sleep (NREM)

It’s the type of sleep without movement of the eyeballs. It is also slow-wave sleep. Dreams do not occur in this type of sleep and it occupies about 70-80% of total sleeping period. NREM sleep is followed by REM sleep.

NREM sleep is divided into 4 stages, based on the EEG pattern. During the stage of wakefulness, i.e. while lying down with closed eyes and relaxed mind, the alpha waves of EEG will appear. When the person proceeds to drowsy stage, the waves diminish.

* + Stage 1:stage of drowsiness.

Alpha waves are diminished and abolished. EEG shows only low voltage fluctuations and infrequent delta waves.

* + Stage 2: stage of light sleep.

It is characterized by spindle bursts at a frequency of 14 per second, superimposed by low voltage delta waves.

* + Stage 3: stage of medium sleep.

The spindle burst disappears. Frequency of delta waves decreases to 1 or 2 per second and amplitude increases to about 100uv.

* + Stage 4: stage of deep sleep.

Delta waves become more prominent with low frequency and high amplitude.

* MECHANISM OF SLEEP

Sleep occurs due to the activity of some sleep-inducing centres in the brain. Stimulation of these centres induces sleep.

* Sleep centres

Complex pathways between the reticular foemation of brainstem, diencephalon and cerebral cortex are involved in the onset and maintenance of sleep are located in brain stem:

1. Raphe nucleus

It is situated in lower pons and medulla. Activation of this nucleus results in non-REM sleep. It is due to release of serotonin by the nerve fibres arising from this nucleus. Serotonin induces non-REM.

1. Locus coerileus of pons.

Activation this centre produces REM sleep. Noradrenaline released by the nerve fibres arising from locus coerulues induces REM sleep.

* Inhibition of ascending reticular activating system induces sleep. Lesion of ARAS leads to permanent somnolence, i.e. coma.
* APPLIED PHYSIOLOGY

1. Insomnia
2. Somnambulism
3. Nocturnal enuresis
4. Movement disorder during sleep.
5. Discuss the role of basal ganglia in coordinating movement.

Basal ganglia are scattered masses of gray matter submerged in subcortical susbstance of cerebral hemisphere. It is composed primarily of

* + - Corpus striatum
    - Substantia nigra
    - Subthalamic nucleus of luys

Basal ganglia form the part of extra pyramidal system, which is concerned with integration and regulation of motor activities. Basal ganglia plays a role in coordinating movement.

It controls muscle tone: it decrease the muscle tone by inhibiting gamma motor neurons through descending inhibitory reticular system in brainstem. During lesion of basal ganglia, muscle tone increases leading to rigidity.

It regulates voluntary movement: voluntary motor activities are initiated by cerebral cortex. However these movements are controlled by basal ganglia, which are in close association with the cerebral cortex. During lesion of basal ganglia, control mechanism is lost and so the movement becomes inaccurate and awkward.

It regulates cognitive control of activity. It regulates conscious movements.

It is responsible for automatic associated movements like swinging of arm while walking.