EEG Signals Play Major Role to diagnose Sleep Disorder

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Abstract: This paper is designed to introduce the reader to how to diagnose sleep disorder with Electroencephalogram (EEG) Signals. Sleep disorder, is a medical disorder of the sleep patterns of a person or animal. Some sleep disorders are serious enough to interfere with normal physical, mental and emotional functioning. Stimulation of center located below the midpontile level of the brain stem inhibiting excitatory areas of (RAS) in the upper brain stem leading to sleep. Discuss the reason for sleep disorder & type of sleep disorder. In this paper, compare with normal person EEG data with abnormal person.

Keywords: Sleep Disorder, EEG Signal & Comparison with normal & abnormal person

I. Introduction
A sleep disorder is a medical disorder of the sleep patterns of a somebody or animal. Some sleep disorders are severe enough to get in the way with normal physical, mental and disturbing functioning. Polysomnography is a test typically ordered for some sleep disorders. Disruptions in sleep can be caused by a variety of issues, from teeth grinding (bruxism) to night terrors. When a person suffers from difficulty in sleeping with no obvious cause, it is referred to as insomnia. In accumulation, sleep disorders may also cause sufferers to sleep extremely, a condition known as hypersomnia. Management of sleep disturbances that are minor to mental, medical, or substance abuse disorders should focus on the fundamental conditions

Sleep is a physiological development which performs recuperative functions for the brain and the body. It is necessary in command to sustain a healthy status for mainly living organisms. The countless of metabolic dysfunctions that are symptoms of deficiency of sleep are a witness to this important fact. A recent finding shows that one third of the human population suffers from various sleep disorders which could be due to the contemporary life style, increased exposure to stress, decreased physical activity or due to the increasing spread of obesity. It is estimated that millions of Americans suffer from sleep apnea but are undiagnosed. The need to alleviate the problems of cost effectiveness and constraints on bed space in sleep laboratories remain. There is also a demand for methods and standardization of criteria for diagnosis in order to conduct unattended home monitoring. Studies has shown that there are changes in cortical activity that occur during sleep disordered breathing (SDB) events. In order to take advantage of this attribute to devise a more economical method to detect sleep disordered breathing events, this investigation focused on the sole ability of cortical Electroencephalography to detect sleep-disordered breathing events.

Fig 1. Sleep Apnea

II. Sleep Disorder
Sleep apnea is a condition in which breathing is repeatedly interrupted during sleep. The time period for which the breathing stops or decreases is usually between 10 and 30 seconds. When these episodes occur repeatedly, sleep apnea can seriously disrupt the quality of sleep. Causes There are three types of respiratory events:

1. Obstructive apnea: caused by a temporary, partial, or complete blockage of the airway

Fig 1. Sleep Apnea
2. Central apnea: caused by a temporary failure to make an effort to breathe
3. Mixed apnea: combination of the first two types

III. Symptoms

Some Symptoms are Given below

- Fatigue and sleepiness during waking hours
- Loud snoring
- Breathing that stops during the night (noticed by the partner)
- Repeated waking at night
- Unrefreshing sleep
- Morning headaches
- Poor concentration or problems with memory
- Irritability or short temper

People with chronic untreated sleep apnea may be at risk for:

- Motor vehicle accidents
- Depression
- Hypertension
- Signs of heart disease

IV. EEG Signal

Electroencephalography (EEG) is the recording of electrical activity along the scalp. EEG measures voltage fluctuations resulting from ionic current flows within the neurons of the brain. In clinical contexts, EEG refers to the recording of the brain's spontaneous electrical activity over a short period of time, usually 20–40 minutes, as recorded from multiple electrodes placed on the scalp. Diagnostic applications generally focus on the spectral content of EEG, that is, the type of neural oscillations that can be observed in EEG signals. In neurology, the main diagnostic application of EEG is in the case of epilepsy, as epileptic activity can create clear abnormalities on a standard EEG study. A secondary clinical use of EEG is in the diagnosis of coma, encephalopathies, and brain death. A third clinical use of EEG is for studies of sleep and sleep disorders where recordings are typically done for one full night, sometimes more. EEG used to be a first-line method for the diagnosis of tumors, stroke and other focal brain disorders, but this use has decreased with the advent of anatomical imaging techniques with high (<1 mm) spatial resolution such as MRI and CT. Despite limited spatial resolution, EEG continues to be a valuable tool for research and diagnosis, especially when millisecond-range temporal resolution (not possible with CT or MRI) is required. EEG signal are categories into some other wave form:

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency (Hz)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta</td>
<td>1 to 4</td>
<td>frontally in adults, posterior in children; high-amplitude waves</td>
</tr>
<tr>
<td>Theta</td>
<td>4 – 8</td>
<td>Found in locations not related to task at hand</td>
</tr>
<tr>
<td>Alpha</td>
<td>8 – 13</td>
<td>Posterior regions of head, both sides, higher in amplitude on</td>
</tr>
</tbody>
</table>
The scalp electroencephalogram (EEG) is a classic non-invasive method for measuring a person's brainwaves. It is used in a large number of fields: from epilepsy and sleep disorder diagnosis to Brain-Computer Interfaces (BCI) and Augmented Cognition. Wearable EEG is envisioned as the evolution of EEG recorders to small unobtrusive devices that are present only on the head. They must be able record the EEG for days, weeks or months at a time without user intervention and must be comfortable and socially acceptable.

![Fig.2 EEG measure for Sleep Disorder](image)

VI. CONCLUSION

This paper has presented the EEG Signal use for diagnose to sleep disorder. It aims to promote technology innovation to achieve a reliable and efficient outcome from the diagnose of sleep disorder and differentiate with all the stages of sleep disorder. This is my initial work on this topic; I continue work & consult with experts & find out more results which will most effective in the diagnose of sleep disorder. More research and development efforts are needed to fully implement the proposed vision.

REFERENCES

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