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## Study of sleep, wake pattern in healthy individuals with reference to different Mizaj

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### Abstract

Sleep is reversible state of human that disengages the body from environment and makes body unresponsiveness. Sleep plays vital role for different physiological and psychological functions and makes body to recover and gain strength for further functions. It is considered an important part of life that leads to enhance many life functions such as memory processing and consolidation of various stimuli, development of brain cells and its complex cellular connections within the brain. Sleep is important for rapid cell division and immunity boosting event makes body smart to survive. Unani system of medicine is solely based on the fundamentals of Mizaj (temperament) and Tabiyat (physis). Homeostasis of Mizaj reflects healthy state of the body and any deviation of Mizaj either qualitative or quantitative leads to diseased condition. According to unani system of medicine there are six essential pre-requisites necessary for life called *Asbaab-e-Sitta Zarooriya* and *Naum Wa Yaqza* (sleep and wakefulness) is one of them. Mizaj of human beings is closely related to sleep and nature of sleep affects Mizaj of the humans and vice versa.

**Keywords:** Tabiyat, Mizaj, Asbab-e-Sitta Zarooriya, Naum wa Yaqza, Ajnas-e-Ashrah

### Introduction

Mizaj is basic fundamental principle of Unani medicine, produced when different *Kaifiate Arba* (qualities) of Arkan (elements) acts and reacts with each others, then previous qualities is replaced by moderate quality known as Mizaj<sup>[1]</sup>. Since *Akhlal* (Humours) has its own temperament as it is a mixture of four *Khilt* (Humour) i.e, *Dam* (Sanguis), *Balgham* (Phlegm), *Safra* (Yellow Bile) and *Sauda* (Black bile). These four humours combine intermix and form body fluid. Maintenance of *mizaj-e-motadil* means the maintenance of static or constant conditions (homeostasis) in the internal environment of the cells or the whole body<sup>[2]</sup>. Unani physician have devised some means and ways with certain parameters to diagnose the Mizaj called *Ajnas-e-Ashra* which are purely based on the sign and symptoms of the individuals.

According to an easy definition sleep is reversible behavioural state of perceptual separation from and unresponsiveness to the surroundings. Sleep is a state of reduced awareness and responsiveness and is associated with reduced movement. Sleep plays an important role to anchor the immunity of an individual and the process of cell division becomes quite rapid during sleep. It is experienced that sleep may have some role in the development of brain cells and connection between them during development of the body. Sleep is involved in memory processing and consolidation gained during previous experience. It is the universal requirement of entire higher life forms including humans and absence of which has serious cause. Globally the world sleep day is celebrated on 13 March to raise awareness of sleep disorders and to reduce burden of sleep problem<sup>[3]</sup>.

### Sleep Architecture

Normal human sleep is comprises of two states one is non rapid eye movement (NREM) sleep and other is rapid eye movement (REM) sleep these runs cyclically while sleeping.<sup>[3]</sup> NREM sleep is further classified into four stages 1, 2, 3, and 4, that represent relative depth of the sleep and each stage has a peculiar characteristic in brain wave patterns in EEG, eye movements, and muscle tone.

### I. NREM Sleep

Sleep begins with NREM and forms about 75 to 80 % of total sleep. On the EEG during stage 1, the brain activity transitions from wakefulness to low voltage, mixed frequency waves called rhythmic alpha wave. Sleep during NREM stage 2 occurs about 10 to 25

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minutes in the beginning cycle and this duration increases with successive cycles, eventually constituting about 45 to 55 % of a total sleep episode. EEG during stage 2 shows relatively low voltage, mixed frequency activity characterized by the presence of peculiar sleep spindles and K-complexes. The stage 3 lasts within few minutes and forms about 3 to 4 % of total sleep and EEG during this stage shows increased high voltage, slow wave activity of the brain called slow wave sleep (SWS). The last NREM stage 4 remains for about 20 to 40 minutes and is approximately 12 to 15 % of sleep. This stage is characterized by increased amount of high voltage slow wave activity with EEG [4].

## II. REM Sleep

The REM sleep is characterized by the presence of desynchronized, low voltage, mixed frequency wave of brain, muscular atonia, with bursts of rapid eye movement. During the start of sleep cycle, the REM sleep is very short and may remain for about 1 to 5 minutes and becomes longer as the successive sleep cycle proceed to later night. The peculiar character of REM sleep is presence of sawtooth wave having 3 to 7 cycle per second with slow alpha wave. REM sleep is also associated with processing, evaluation and consolidation of memory. Muscular atonia and loss of reflexes is very important that occurs during this period as it prevents an individual from acting out their dream or nightmare while sleeping [4].

According to the principles of Unani medicine, Mizaj and *Naum wa Yaqza* have very strong correlation. Good quantity and quality of sleep and wake pattern shows the optimum temperament of an individual. Since sleep is basic required of the body as described under *asbaab-e-sitta zarooriya* and it is a function of brain and Mizaj of the brain determines the nature and pattern of sleep and wake. Individuals with *Damvi* mizaj experience sound sleep, less and disturbed in *Safravi* mizaj, more in *Balghami* mizaj and very less with nightmares in *Saudavi* mizaj. This strong relation of mizaj and sleep wake pattern is evaluated in this study.

## Material and Method

It is an observation correlative study carried out in the department of *Munafe-ul-Aza* (Physiology) of A & U Tibbia College & Hospital. Total 60 healthy individuals with different age groups were enrolled. Subjects were given informed consent form to go through the details and sign the consent form. Identification of Mizaj is done with the help of temperament assessment proforma generated by Central Council for Research in Unani Medicine (CCRUM). Sleep and wake pattern of each individual is evaluated with sleep wake assessment proforma called Pittsburgh Sleep Quality index (PSQI).

### a. Inclusion criteria

- Healthy individuals of either sex with ages between 20-70 years

### b. Exclusion criteria

- Person below 20 years and above 70 years
- Alcoholics, Smokers and tobacco users
- Persons with any chronic disease
- Persons with past history of trauma
- Pregnancy

### c. Investigations

- Mizaj (temperament) of the individuals were assessed by a standard questionnaire based on *Ajnas-e-Ashrah* and formulated by Central Council for Research in Unani Medicine (CCRUM), Ministry of AYUSH, New Delhi.
- Sleep and wake pattern of the individuals were assessed by standard questionnaire tool called Pittsburgh Sleep Quality Index (PSQI).

## Review of Literatures

Although the primary function for sleep is not known at present. Sleep is thought to be necessary for repair of bodily 'wear and tear', memory encoding, and learning processes [5].

Sleep homeostasis depends upon duration of awake and can be quantified physiologically by the main objective measure of sleep electroencephalography (EEG) [6].

Waking state is defined by Bremer (1954) as a dynamic equilibrium between the activation of cerebral neuronal networks maintained by the incessant impact of innumerable ascendant and associative impulses and the cumulative functional depression resulting from the very continuity of this state of activation [7].

Two interactive processes, one is sleep promoter called process S and other that maintains wakefulness called process C that makes a person to fall asleep by homeostasis that accumulates need of sleep across the daytime, peaks just prior to bedtime at night and vanishes throughout the night while process C is wake promoting and regulated by the circadian system [8].

The REM sleep is particularly associated with dreaming and when the subjects were awakened in the REM stage 80 % of them reported about dream interruption. There is inhibition of spinal motor neurons by brainstem that mediates suppression of postural motor tonus during REM sleep [9].

As stage 2 NREM progress, there is gradual appearance of high voltage slow wave activity in the EEG and fulfil the criteria for stage 3 NREM sleep, that is high voltage (at least 75  $\mu$ V), slow wave (2 cycle per second) activity accounting for more than 20 % but less than 50% of the EEG activity [10].

Sleep is closely related to sleeping environment as extremes of temperature leads to disruption of sleep. NREM sleep is less sensitive than REM sleep in terms of temperature of surroundings. There are clear evidences from human beings and other species that mammals have very less ability of thermoregulation during REM sleep [11].

The Pittsburgh Sleep Quality Index (PSQI) is considered to an effective, self-report measure, retrospective assessment tool used to measure the quality and pattern of sleep of individuals especially in older adults. It is used to differentiate poor (>5) to good ( $\leq$ 5) sleep score based on measurement of its domains [12].

In neonates the sleep duration is about 16 to 18 hours daily, by 12 months of age it decreases to 14 to 15 hours per day and in young children total sleep decreases by 2 hours from age 2 to age 5 years. Sleep architecture continues to change with age across adulthood; younger adults may experience brief awakenings; older peoples typically report disturbed sleep and sleep about 36 percent less than age 5 children [13]. There is little difference in sleep and wake pattern between male and female sexes. Sleep latency is longer in women compared with men; Women <55 years report more

sleepiness than men while older women report 20 minutes less sleep than men; women have increased slow wave sleep (SWS) as compared with men at any given age<sup>[14]</sup>.

Many hormones have great impact on sleep wake timing and sleep stages. Cortisol reaches to lowest point at around midnight and its secretion increase after wakefulness and peaking in the first 30 minutes of wakefulness<sup>[15]</sup>. Melatonin secretion begins during late evening and peaking about at midnight. The onset of melatonin is strongly coupled with subjective levels of sleepiness and is called 'open the gate to sleep'<sup>[16]</sup>.

Sleep is similar to rest and wakefulness is similar to physical activity. Sleep strengthens the innate power of the body because innate heat get accumulate in the interior of the body. It moistens the sensory spirit to produce laziness. It prevents to dissolve the matter of spirit and excessive dissolution of humours. There is more sweating during sleep. More wakefulness leads to dystemperament of the brain i.e. dryness of the brain causing weakness resulting in various psychological disorders<sup>[17]</sup>.

Sleep leads to diminished use of sense. Sleep is induced when there is accumulation of humours in brain and due to accumulation of vaporous humours by pushing towards peripheral part of brain. This humours leads to laziness in muscular tissue, sluggishness in nervous tissue and spirit, avoiding the spirit to enter the muscles. There is rest in sensation and decreased functions of body up to a minimal level as respiration growth and digestion remain continue<sup>[18]</sup>.

Normal sleep is believed to be due to the adequate ratoobat and baroodat i.e. wetness and coldness in the brain, if there is any deviation that leads to insomnia implies the predominance of yuboosat and hararat i.e. dryness and hotness in the brain<sup>[19]</sup>.

Razi with reference of Jalinoos (Galen) described as, moderate sleep produces good quality of blood, excessive sleep impairs humours, and inadequate sleep is responsible for bilious humours and fatigue increases hiddate safra and produces pure black bile<sup>[20]</sup>.

Tabiyat suggests sleep just for two reasons, one is that sleep induces rest, peace and pleasure to the brain and senses, second reason is because sleep helps in the digestion and metabolism to produce humours by diversion of innate heat towards interior of the body. Sleep about 9 hours daily is normal for a healthy and normal person having age of early adulthood up to manhood (sin-e-shabab or sin-e-waquf). Sleep strengthens the Nafs Tabayi, increases innate heat, produces excellent humours, and relaxes the muscles spasm<sup>[21]</sup>.

The benefit of sleep is that it resolves the soul and increase the power of thinking. Sleep leads to consolation of different organs, enhance the health and body building process. Excess sleep has many adverse effects as it leads to weakness and accumulation of *balgham* and cold dystemperament in the body. Lack of sleep causes excitement and dissolves the innate heat and fast break down of body<sup>[22]</sup>.

Sound sleep is defined as deep, continuous, moderate in duration that occurs after digestion and stoppage of borborygmi and passing of food to small gut. Deepness of sleep means hard to wake up, continuity of sleep help in the digestion of food as spirit moves towards interior to work the digestive process. Sleep should be moderate in duration because lack of sleep dissolves the spirit and innate heat

(*Hararat-e-Ghariziya*) and excess of sleep leads to cold dystemperament of the body. Sleep should occur after digestion and borborygmi because it helps in sound sleep<sup>[23]</sup>.

According to its characteristics and quality, sleep is quite similar to rest. It is because organs and vital spirit remain immobile during sleep and spirit move towards interior to decrease break down during sleep just like to rest. During sleep there is increase in humours and leads to eliminate fatigue just like rest. Elimination of humours and catabolism almost stops during sleep. Wakefulness is just like the physical activity as it generates heat due to increased functions of the organs so heat is generated. There is lots of break down during wakefulness which leads to *Yaboosat* (dryness). Excessive waking is the cause of weakness of the mental ability because it weakens the physiological faculties<sup>[24]</sup>.

## Result and Discussion

During the course of study, individuals were categorized according to their respective temperament (Mizaj) and into different age groups. The result is analyzed according to the mizaj, age and gender. Maximum numbers of individuals were *Damvi* (43.3 %), *Balghami* (33.3 %), *Safravi* (16.67 %) and least numbers of individuals were *Saudavi* (6.67 %). The mean PSQI of each mizaj group and sex, *Damvi* individuals have mean  $\pm$  SD PSQI=5 $\pm$ 2.61 (PSQI M: F=4.071: 6.0833), *Safravi* individuals have mean  $\pm$  SD PSQI=5.9 $\pm$ 2.67 (PSQI M: F=5.667: 6), *Balghami* individuals have mean  $\pm$  SD PSQI=4.95 $\pm$ 2.9 (PSQI M: F=4.44: 5.4378) and *Saudavi* individuals have mean  $\pm$  SD PSQI=9.5 $\pm$ 1 (PSQI M: F=9.333: 10) (Figure 1).

The mean PSQI in different age groups are as; age group 21-30 years mean  $\pm$  SD PSQI=6.18 $\pm$ 3.09, age group 31-40 years mean  $\pm$  SD=4.71 $\pm$ 2.49, age group 41-50 years mean  $\pm$  SD=3.72 $\pm$ 1.618, age group 51-60 years mean  $\pm$  SD=5.45 $\pm$ 2.38 and age group 61-70 years mean  $\pm$  SD=7.62 $\pm$ 3.228 (Figure 2).

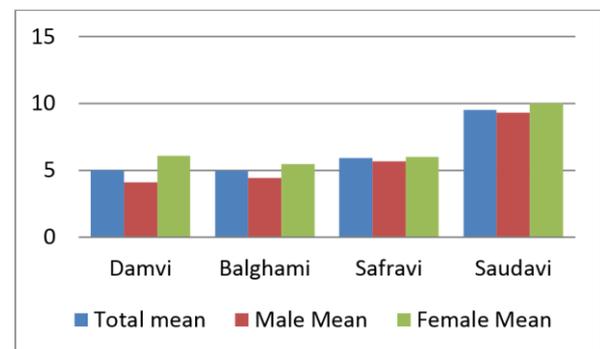


Fig 1: Mizaj V/S Sex Wise mean PSQI

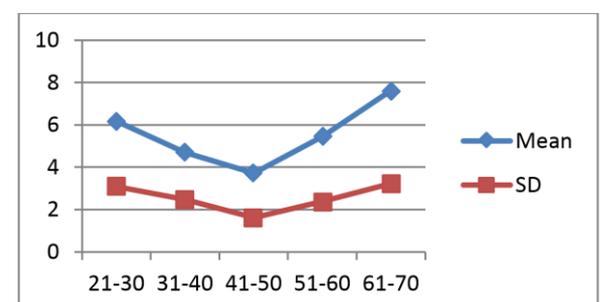


Fig 2: Age wise Mean PSQI with SD

On the other hand the sex wise mean PSQI in all four mizaj show that males sleep is good in comparison to females (PSQI of male < female) as PSQI > 5 score means disturbed sleep. Analysis of the total individuals show sleep and wake pattern in different mizaj with respect to age and sex as; *Balghami* mizaj individuals experience sound sleep (PSQI < 5), *Damvi* individuals have good sleep (PSQI = 5), and *Safravi* individuals have mild problem with sleep (PSQI > 5) and *Saudavi* individuals have very disturbed sleep (PSQI >> 5).

### Conclusion

The result perfectly follows the principle of mizaj and sleep wake relation described in Unani literatures. Age group data shows some interesting fact such as young adults show disturbed sleep PSQI=6.18, then it declines as PSQI=4.71 in middle age adults, in 41-50 years age groups it is least PSQI=3.72, then it increases as PSQI=5.45 in 51-60 and highest in 61-70 years with PSQI=7.62. The disturbed sleep of the young adults is possibly due to change in life style, prolonged use of cell phone, educational stress etc. Saudavi individuals have most disturbed sleep followed by Safravi, Damvi individuals show good sleep while Balghami individuals experience sound sleep. Female in each age group and mizaj show disturbed sleep.

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