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Editorial

Chronobiology to Chronopsychology: Implications in Psychotherapy

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Chronobiology is the study of biological rhythms. Biological rhythms are driven endogenously in the form of biochemical or physiological processes and are altered by external cues or stimuli.[1] These external environmental cues or stimuli are the zeitgebers, the important one of these cues is daylight. Zeitgebers the stimuli which are capable to entrain/alter circadian rhythms.[2] The daily rhythms have been observed not only in mammals but also in plants, fungi, and cyanobacteria.[3] Recent studies have shown that the pacemaker for daily rhythms is located in the supra-chiasmatic nucleus (SCN) of the hypothalamus in the brain.[4] When the SCN is stimulated by any zeitgeber like light, temperature, etc. from the surroundings, it sets the principal timing cues to synchronize the circadian rhythms of different proteins in brain tissues.[5] It has been widely studied that proteins are responsible not only for making cell structures but also involved in physiological functioning. So, depending on time of the day, the physiological functioning is altered which further leads to the alteration of the behaviours.

Chronopsychology

Chronopsychology can be defined as the study of behaviors that oscillate rhythmically with time. These behaviors may have circadian (about 24 hours), infradian (more than 24 hours), and ultradian (less than 24 hours) rhythms. Additionally, it has been reported that there are seasonal variations as well as due to altered environmental zeitgebers leading to altered proteins and physiology.[6] In this way, the altered profile of proteins and physiological parameters, leads to altered behaviors.[7] Studies have indicated that due to significant daily alteration of biological molecules at cellular levels, may lead to daily variation in mood which may be responsible for the development of mood disorders including depression, mild depression, and seasonal affective disorder.[8]

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The gap in psychotherapy?

As literature confirms that there are daily alteration of biochemicals including brain proteins which may alter respective physiological activities. So, due to the time-dependent alteration of certain physiological parameters, the linked behaviors may fluctuate at other time points of the day. As studies have shown that various brain neurotransmitters that are involved especially in cognition like dopamine show daily variations.[9-10] Due to the daily variation of neurotransmitters, psychological functioning may show daily variations and it is indicated that circadian rthytms disruption may lead to mental health issues.[11] Studies have shown that physiological functions like memory performance and learning follow a daily rhythm.[12] So, if the disruption of the circadian rhythm leads to mental health issues, that means health issues may have time dependency. As physiological, psychological, and mental health issues have shown daily rhythms, so psychotherapeutic intervention may have a different time-dependent effect.

Effective approach

As discussed above, physiological parameters may fluctuate during 24 hours of the day due to specific protein levels at the specific time of the day**.** This variation may lead to altering certain behaviors. So, any psychotherapeutic intervention aimed at managing behavior may produce better outcomes when planned at a certain time slot of the day that needs to be studied. However, studies have shown that different cognitive skills including learning, memory are due to neurotrophic factors that show daily variation with a peak in the morning time slots.[13] So, if any psychotherapeutic session aimed for augmenting cognitive skills may be

accomplished in the morning time slots for better outcomes. Psychotherapy is aimed at suggesting the client and hyper suggestibility is observed with slow brain waves, especially in the prefrontal cortex. The peak of circadian variation of alpha brain waves (0-12 Hz) is linked with low body temperature[14] and circadian rhythms of low body temperature are the evening hours. So, it may be assumed that psychotherapy aimed to increase suggestibility like hypnotherapy should be conducted in the evening hours as compared to morning hours. The suggestions in the mornings may be resisted due to the peak levels of cortisol, as cortisol is linked to distress which makes people more critical and suggestibility may be reduced. The author names this time-based psychotherapeutic intervention as chronopsychotherapy.

Therefore, understanding the basic principles of chronobiology can help how biological processes follow rhythms and how this impacts therapeutic intervention. So, it may be concluded that therapeutic intervention either pharmacological or psychological may have different outcomes at different time points of the day that needs to be explored and certain empirical studies should be conducted to validate this concept of chronopsychotherapy.

Conflict of interest: Non declared.

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