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Correlation of Age, Yoga and Circadian Rhythm on Attention

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Abstract

A field investigation was conducted concerning the impact of Yoga practice and Circadian Rhythmic impact on Span of Attention of the subjects. All the subjects were randomly selected from different Yoga practicing center throughout Orissa. They are divided into two groups like Yoga practicing groups (n=40) and Non-Yoga practicing Group (n=40). All the subjects are tested individually for four times in a day like morning, noon, evening and night, for their span of attention test. The analysis of results basing on their average span of attention score revealed that both the groups differed significantly with regard to their circadian Rhythmic impact. However, interaction impact is not found to be statistically significant which revealed the idea that the activity and arousal level may have certain other physiological aspects to be explored further.

Keywords: Age, Yoga, Circadian Rhythm and Attention

Activity and arousal are two important aspects of our behavior (Morgan *et al.,* 2004). Research findings indicate that activity is mostly guided by our circadian cycle (Daniel and Potasova, 1989; Misra, 2004) whereas arousal is considered as a step forward to the activity level in a sleep-wake cycle of consciousness, which can be manifested, controlled and modified in an organized manner through the practice of Yoga. Yoga is that process, where the consciousness aroused by the power of the 'pretty self' is uplifted to combine itself with the higher 'universal self' of its mental maturity that helps one to concentrate and mediate upon the transcendental 'Atman', which is the main source of knowledge, intelligence and bliss.

Both Circadian Cycle and Yoga deals with the conscious state of the human beings and as our consciousness is influencing most of our behavioral manifestations, like learning, memory, attention, perception, emotion, thinking, imagination and creativity etc., this study aims at analyzing the impact of Yoga Practice on Circadian Rhythmic behavior of the individual. Again understanding and realizing the benefits of Yoga and Practicing it in our daily life is subject to the development of the age. Thus this study also aims at analyzing the impact of age on the yoga practice, and circadian rhythmic impact of behavior of the individuals.

Besides this study also aims at analyzing the interaction impacts of all these three factors, Age, Yoga and Circadian Rhythm on the Behavioural measures (span of attention) of the human beings. Awakening of one's own body and mind is having its origin from the very date of creation. In this age of 21st century the awakening of self is having much more importance in promoting good mental health of the human beings. This alertness has an important impact on our attention span which is considered to be the key mechanism in our behavioural manifestations. The state of activating level in the series of different cycles of sleep and wakefulness (Spiegel *et al.,* 2002) is generally explained in terms of Circadian Cycle. This activating level of the mind in most of the cases generated controlled and guided by the circadian cycle which has its origin from the very childhood stage of the organism basing on different ecological, anthropological, sociological and psychological points of view.

'Circadian Cycle' is the cyclic changes in bodily process occurring within a single day basing on our conscious awareness. It is a biological rhythm which explains the cycle of our working states of consciousness in everyday. That means, it is the levels of awareness of organization from external stimuli in a cyclic changes of bodily process .These cyclic fluctuation in basic bodily functions are reflected in the performance on the several tasks – the tasks relating to physical activities and cognitive tasks which are having very close relationship with the circadian rhythms . However, basing on the complexity of the tasks it increase or decreases (Daniel and Patasova, 1989)According to the research scientist our body in each and every day show daily cyclical changes like production of hormones the body temperature, the blood pressure etc. that fluctuates across the day . Some are highest in late afternoon and still some are lowest in the evening and night. They not only affect the physical activities but also affect learning memories perception and other mental processes. The reason behind this is the biological clock within the organism that times various circadian rhythms even during sleep, located in a portion of hypothalamus in the brain, specifically in suprachiasmatic nucleus (Moore and Card, 1985). The nucleus responds to the visual inputs from the eyes and it either stimulates or inhibits the pineal gland. This gland in turn, secretes melatonin hormone with far – reaching impacts. Melatonin exerts a sedative impact, reducing activity and increasing fatigue.

Exposure to day light stimulates suprachiasmatic nucleus, and this is in turn reduces the secretion of melatonin. But darkness enhances the secretion of melatonin. Thus as the day light increases our activities increase but as the darkness proceeds our activities gradually decreases. Perhaps this is the reason of complaining by some people regarding their feelings of depression if they can't get a dose of sunlight at least occasionally during the winter months, which is known as Seasonal Affective Disorder (SAD) (Rosenthal, 1985). If the nucleus is somehow or other damaged or several pathways connecting to the eyes are destroyed, then Circadian Rhythm tends to disappear totally (Moore and Card, 1985). But the interesting point is when left to its own activities the biological clock seems to operate in twenty – five hour duration rather than twenty – four hours a day.

The important noticeable fact in this context is the role of individual differences in Circadian Rhythm. Some people are more alert and active in morning than some other people who are more active in the night. The morning people (more alert in morning like a lark) experience peak in alertness and energy in the day whereas night people (more alert in night like an owl) experience alertness and energetic in the afternoon and evening. Not only this but also both morning and night people do differ in some other respects like morning people are having more and higher adrenaline secretion, peak in body temperature (Wallace, 1993), and susceptible to hypnosis (Wallace, 1993) in the morning and early afternoon than in night, in contrast to the night people. The best example in this context is' Jetlog' and 'Shiftwork' in industry (Angerspack *et al.,* 1980; Bickford, 1988).

Besides waking state of consciousness frequently occur between contrasting states of consciousness because our attentional or information processing capacities are quite limited. It shifts from one to another (Logan, 1988). The reason is the automatic pilot. That means the information processing occurs automatically basing on our attention capacity (Shiffrin and Dumais, 1981) and Sleep wake cycle of consciousness .This consciousness, while influencing our attention capacity (Misra, 2004) and information processing also has similar influence upon our intelligence level. There are some studies which explain that conditions of

social disadvantage adversely affect certain environment, sensitiveness and intellectual abilities (Jachuck and Das, 1991).Some studies also have reported that the socially disadvantaged children. Show a cumulative deficit or a progressive retardation in their cognitive skills, intellectual and language development as their age increase in comparison to their advantaged counterparts (Jachuck and Mohanty, 1974), and individuals differ in their working memory capacities basing on better or poorer in manipulating languages (Just and Carpenter, 1992). Some studies explained that socially disadvantaged children are less intelligent, poor in Arithmetic ability and learning disables (Jachuck and Das, 1991, Siegel and Ryan, 1989). It has been observed that in Indian set up condition of social disadvantage is created by economic and family educational background factors which consistently go with cast group and place of residence factor (Rath, Dash and Dash, 1979). Condition of social disadvantage also adversely affect certain environment – sensitive and intellectual abilities). It was found that the rural and urban boys of high SES differed significantly so far as their cognitive development was concerned. The impact of socio-economic status on cognitive development of children was also well detected by Nigam and Sharma (2001). Again Basanti and Mukhapadhyaya (2001) investigating on the impact of environmental factors on Academic achievement of high school students found that the achievement is significantly related to their home environment than the school environment, (Verma and Sangeeta, 2001) According to Sangwan (2001), ecological factors also plays a significant role in the children's cognitive development, (Niraula and Mishra, 2001; Khandelwal, 2000).

Objectives

Hence the primary objective of the study is to investigate: (1) Whether the age and Yoga practice have their differential impacts on span of attention of the subjects as a measure of Circadian Cycle. (2) Whether there is any interaction impact of Yoga practice and circadian cycle on the span of attention of the subjects as a Behavioural measure. (3) Whether there is an interaction impact of Age and Yoga practice on Circadian Cycle. (4) Whether the combined impact of Age, Yoga practice and Circadian cycle affecting the span of attention of the subjects. Behavioural Measurement is the span of attention of the subjects

On the basis of the above objectives, the following hypothesis can be suggested: (a) The practice of Yoga can have a change (if any) in Circadian Rhythm. (b) There is the impact of age on Yoga practice. (c) There is the impact of Circadian Cycle in behavioural manifestation. (d) There is the interaction impact of Circadian Cycle and Yoga practice on span of attention of the subject. (e) There is the impact of age, Yoga practice and circadian cycle on the span of attention of the subject.

RESEARCH DESIGN AND METHODOLOGY

Schematic presentation the design factors:

Factor B	Factor A (age)			
	a1	a2	a3	a4
	c1	c1	c1	c1
b1	c2	c2	c2	c2
	c3	c3	c3	c3
	c4	c4	c4	c4
	c1	c1	c1	c1
	c2	c2	c2	c2
b2	c3	c3	c3	c3
	c4	c4	c4	c4
	c1	c1	c1	c1
	c2	c2	c2	c2
b3	c3	c3	c3	c3
	c4	c4	c4	c4
	c1	c1	c1	c1
	c2	c2	c2	c2
b4	c3	c3	c3	c3
	c4	c4	c4	c4
A=Age, B= Duration of Yoga practice, C= Circadian Rhythm (Shifts of the Day).				

Sample

The study comprised of four groups of subjects, having the age group of 20-24 years, 25-29 years, 30-34 years and 35-40 years, having 10 subjects per cell (n=10). Again they are also divided into four other groups basing on their duration of Yoga practice like (1) 0 practice (no practice on Yoga) (2) practiced Yoga for three months, (3) for six months and (4) for twelve months onwards. Hence total subjects to be used in this study are 160.

Tool

The apparatus used to test the span of attention of the subject by using Tachistoscope.

Procedure

All the subjects are divided into four groups basing on their age groups like (i) 20-24 years, (ii) 25-29 years, (iii) 30-34 years, (iv) 35 to 39 years of age. Then these subjects were divided into four groups basing on their Yoga practice, as no Yoga practice group (zero practice), practiced yoga for 3 months, for six months and for 12 months onwards. Again each of the subjects are administered a span of attention test individually, for four times a day (at 6 a.m., 11 a.m., 4 p.m. and 9 p.m.).

So there are three treatment conditions, A-Age, B-Yoga practice, and C-Circadian cycle, all are having four divisions of groups. Thus the study comprised of three factorial designs (A*B*C), each having four levels (4*4*4) with last factor repeated. The first two factors are between factors and third factor is within group design factors that are the same subjects repeatedly tested for four trials in a day, for his/her Circadian Rhythmic impact.

In this experimental design the dependent variable is the span of attention of the subject to the independent variable of Age, Yoga practice and Circadian rhythm.

RESULTS

The analysis of the collected data is made by the appropriate statistical methods, such as ANOVA with last factor repeated and also by the help of multiple comparison techniques (Newman-Keuls Posthoc Test).

DISCUSSION AND CONCLUSION

The analyzed data were interpreted and discussed in the light of the supportive and contradictory findings The means of span of attention scores of Yoga practice and Non Yoga practice groups, irrespective of Circadian Rhythms, are 3.91 (SD=5.81). And 3.14 (SD=4.12), respectively. This group difference was found to be statistically significant. In other words Yoga practice has beneficial impact with regard to the span of attention scores of the subjects.

Table (1): Means (Ms) and Standard Deviation (SDs) of the Span of Attention Scores of the Yoga Practice and Non Yoga Practice Subject Across Four Circadian Rhythms irrespective of Age.

GROUPS	CIRCADIAN RHYTHMS							
	Morning		*Noon*		*Evening*		*Night*	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Yoga Practicing	4.03	0.78	4.26	0.49	3.70	0.67	3.63	0.71
Non-Yoga Practicing	3.7	0.74	3.93	0.82	3.7	0.59	3.23	0.57

The means of the span of attention of scores of the subjects at morning, noon, evening, night irrespective of Yoga practicing impact are 3.86 (SD=3.95), 4.09 (SD=4.16), 3.70 (SD=3.75), and 3.43 (SD=3.49), respectively. These mean differences were found to be statistically significant. In other words circadian rhythm was found to have a significant impact on the span of attention of the subjects. Similarly the impact of age irrespective of Yoga practicing group with regard to the span of attention level were also found to be statistically significant in the four groups {3.56 (SD=2.95), 4.07 (SD=4.16), 3.57 (SD=2.75) and 3.21 (SD=1.49)}, respectively Moreover the subsequent Newman-Keuls post-hoc test revealed significant differences among all the possible comparisons. It is found out that all the subjects are having less span of attention during the night than the other shifts of the day and are having facilitatory impact of activity level in favor of noon shift.

Table (2): Two-way ANOVA with Repeated Measure on the Last Factor Performed on the Span of Attention Score of Yoga Practice and Non Yoga Practice Subjects observed under Four Different Circadian Rhythms of a Day.

Sources of Variation	SS	Df	Ms	F
Between Subjects	5068.43	29		
A (Yoga Practice)	9.96	1	9.96	16.06**
Subj.w.grps(error)	17.58	28	0.62	
Within Subjects	80.33	90		
B (Circadian Rhythms)	7.09	3	2.36	2.74*
A X B	0.74	3	0.25	0.29
BX Subj. Within Groups	72.5	84	0.86	

Table (3): Newman-Keuls Posthoc Test Performed on the Means of Span of Attention Scores of the Subjects observed under four Different Circadian Rhythms of a Day.

Means	Night (3.43)	Evening (3.70)	Morning (3.85)	Noon (4.09)
Night -(3.43)	----	.37*	.42*	.69*
Evening -(3.70)		----	.15*	.39*
Morning -(3.85)			----	.24*
Noon -(4.09)				----

The non-significant interaction impact of Yoga and Circadian Rhythm on span of attention score revealed the idea that the activity and arousal level may have certain other physiological aspects for which the interaction between these two factors is not perfectly found out. Basing on the above discussions it can be concluded that Yoga and Circadian Rhythm have their differential impacts on the span of attention of the subjects. The subjects were more attentive during the noon shift compared to other shifts of the day.

Academic Significance

As the study aims at measuring the span of attention and attention is the first step of cognitive processing of the individual, it is surely a milestone to the academic atmosphere in any age, in any sex and in any situation one needs.

Relevance of Study

In now-a-day society most of the human beings are suffering from physical and mental disease. The indecision, apathy, lethargy, laziness, erroneous perception, lack of concentration, crazy for worldly pleasure, unstable attention are puzzling the mind of the individual to a great extent. In order to get rid of all these negative manifestations, Yoga psychology came forward to restore the conscious state of the mind since the age of Patanjali. Hence this study aims at adding and restoring the ideas and impacts of Yoga to the present day society, so that all can live a fruitful life in this material world, which can have a positive impact in national and international level.

Contribution to Knowledge

Yoga and Psychology always go side by side from their origin. Yoga is considered as a royal need to knowledge and psychology is helping in creating motivation to practice Yoga that ultimately helps in achieving the true knowledge and maintaining balance in entire life span.

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