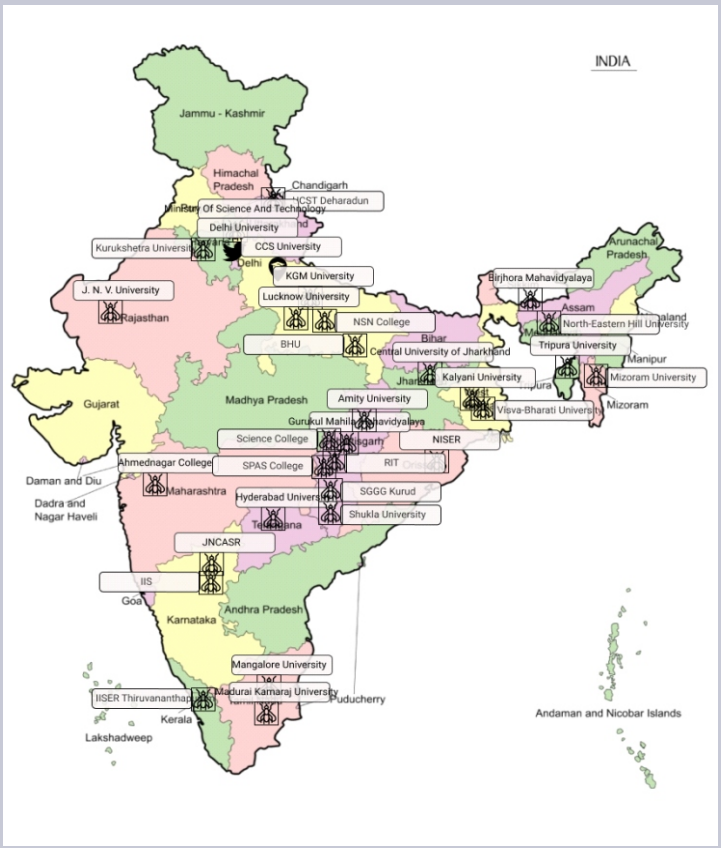
Samay

Newsletter- Indian Society for Chronobiology

A bi-annual publication | Issue 1 July, 2021 | https://chronobiologyindia.org

Office Bearers



If you want to become a life member

Contact:
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Secretary
Indian Society for Chronobiology
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Inside....

Editor's note

The Indian society of chronobiology is a professional body to foster, promote and propagate chronobiology not only among the future chronobiologists but also among the school students and common man. It provides platform for interaction among the national and international experts.

There are huge change in the living style of today's youth which has been thrust upon them by the compulsions of their profession and advancement of S&T in today's world. The internet has bring down the communication boundaries across the world and the same has been reinforced by the COVID pandemic. These compulsions have brought a life style which is no more in sync with the environment resulting in undesirable behavioural, social, physical, emotional and many more issues.

With effort of a great team and support of our members, we bring to you the current issue of SAMAY. Here, we have included articles that highlight the changes in our environment and how they are affecting our Chronobiology. In the changing scenario, our effort is to spread awareness and work towards a healthier and better future.

Bhanu Pratap Singh
Editor in chief

We are delighted to bring you this bi-annual newsletter. With the help of its members and efficient office bearers, we are working hard to maintain the glory of the Indian Society for Chronobiology together. It is truly a monumental effort to build the society as a platform for bringing scientists, academicians and researchers together in the field of Chronobiology. Despite the challenges of Covid19 pandemic, the Indian Society for Chronobiology has continued to progress, demonstrating its credentials for excellence through the execution of various programs.

InSC has helped hosting dynamically vibrant events and activities. Our previous issues of "SAMAY" the newsletter highlighted how the society is always active and looking for opportunities to organize and aid different scientific activities. It is the effectiveness of the members and executive committee that allows many positive things to happen in the society.

We would like to take this opportunity to thank everyone who helped us in bringing out the present issue of "SAMAY" the newsletter. We are thankful to honorable Executive members of the society for their faith and generosity in entrusting us with the editorship of this newsletter.

We also appreciate the members who made our work very easy by responding to our request in a timely manner.

Namram Sushindrajit Singh
Aakansha Sharma
Editors

About Indian Society for Chronobiology

The Indian Society for Chronobiology was founded on 12th December 1977 in Mumbai, India.

We are a registered Non-Governmental Organization as per Society Registration Act XXI of 1860 with a key focus on Education, Literacy and Science & Technology.

Our major aim is to provide awareness and encourage the study of Chronobiology in our country. And also, to provide yearly forums for discussion and exchange of ideas among chronobiologists across the globe. Through our website, meetings and exchange programs our society engages scientists of all backgrounds and nationalities. Since our establishment, we have been involved in organizing various symposiums and conferences, workshops and training schools. Our society has also been involved in organization of motivational programs for school students and DST-NCSTC funded talks for Kalinga prize awardee(s).

We are always looking forward to tie up with institutes and aid and support different scientific activities in the country.

We are delighted to bring to you the bi-annual newsletter "SAMAY"

Sanjay K. Bhardwaj
Secretary, InSC

From President's desk

Dear Colleagues,

Greetings to all members of the Society!

Congratulations to the office bearers of the Indian Society for Chronobiology (InSC), taking over from 01 April 2021. The Covid-19 Pandemic for about year-and-half has brought us all in an unprecedented situation, and we continue to have challenging and uncertain times ahead. However, I do hope you and your family are safe, and you are continuing your academic efforts following all the protocol and norms, as suggested by experts and the Government.

Friends, the perception of the situation is what that matters, and this we as Chronobiologists understand better than the others. In this background, let me share with you a story. Two close friends decided to walk together towards a destination. On the way one kept cool, whereas the other got very frustrated. A bystander asked to them why two friends were reacting to the same situation so differently. The one who looked frustrated complained that the walk-way was so rough and not being maintained, the weather was unfriendly, etc. The other person however remarked that its useless to lose calmness when I know I have covered much of my travel, and the destination is just a few kilometres away from here.

Friends, I feel pride that InSC community is though small but very strong. Even during the period of pandemic, the InSC has been active. It has organized two major conferences, one in Delhi University and the other in JNCASR, Bangalore, and two NCSTC-sponsored programs for Science teachers and students of Uttar Pradesh.

I look forward to hearing from you about the activity you are currently involved in, or plan to do in next six months. The InSC will support you in all possible ways in conducting any activity that comes under its mandate.

Very best wishes to you all of you.

Vinod Kumar
President, InSC

Scribbles from Young Chronobiologists

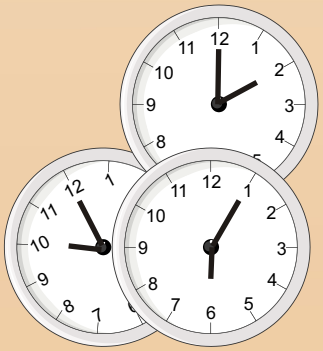
There is a right time to eat your food!

Twinkle Batra
University of Delhi

The earth rotates on its own axis approximately every 24h which exposes organisms that inhabit the planet earth to daily cycles of light-dark and temperature, and hence food availability. For billions of year, all life has relied on the earth's predictable rhythm of the day (light) and night (darkness). Clearly, the biological processes are phased that they recur in consistent relationship with one another and with the external environment. For instance, cycles of sleep-wake, activity-rest and growth-regression recur at regular intervals and in synchrony with the environmental day-night periodicity. However, there has been a major alteration in the environment, particularly in environmental day-night cycles. This has vastly improved our living condition and has added to our efficacy and productivity in the work environment.

We know how important it is to have the artificial light available, if we imagine or choose to live at a place where there is no artificial light available. In the absence of artificial lighting sources, after the sunset you will not be able to get any work done. However, the benefits of technological innovation for the artificial light from candles to lamps to electricity bulbs and the electronic gadgets that emit light has significantly added to our problems, especially related to health and well-being of humans, animals and ecosystem. Thomas Raap and colleagues found major consequences of exposure to light at night including earlier activity onset, increased nocturnal activity under LAN in great tits. Light at night has also been shown to disrupt the daily rhythm with loss of nocturnal peak in melatonin secretion in several birds. Kumar and colleagues clearly showed that eating at the “wrong time” (i.e. at night hours in a diurnal species) resulted in the fat deposition and body mass gain, and an impaired metabolism, however, the negative effects of LAN could be ameliorated if the food availability was restricted only during the day-time. Overall, illuminated nights negatively impact the molecular underpinnings of the sleep and metabolism and associated pathways in diurnal animals and the effects can be avoided or atleast minimized by “not eating at the wrong time”.

The nutritional dogma: A calorie is a calorie
Well... no more!
Its not just what you eat
but when you eat



Students in the wake of Covid-19 pandemic

Dr. Abhilash Prabhat
CCS University

Since December 2019, COVID-19 has been a major challenge for students and citizens working across the globe due to restricted traveling, physical proximity and lockdown. All these means are necessary to curb down progression of disease, however, staying in isolation and prolonged non-interaction with a social group and peers can have effect on sleep-wake timings and mental health (mood, anxiety and depression). Every phase of pandemic (preparation, punctum maximum and normality phase) has pushed students into extreme prolonged social distancing condition in which only online medium of classes are possible. India, like any other densely populated countries saw a couple of peaks in number of individuals affected by virus which hit urban and rural population both.

Many studies have collected and analyzed the effect of pandemic on various socio-demographies including school and college going students, working class and pregnant women across the world.

Researchers from India, Bangladesh and China found that students were suffering from low self-esteem, higher anxiety and increased depression as expressed via various questionnaires. It has been observed that participants delayed sleep timing (later than 12:00 AM) and get up timing as they increased time spent on the bed. A recent study from Prof. Vinod Kumar's lab in Delhi University has shown that internet usage has negative impact on sleep and mood in college going female students. Also, study from AIIMS Rishikesh confirmed that the pandemic decreased parental control over phone causing reduction in focus on academics (loss of concentration) and reduced sleep quality among school going teenagers. Another study underway suggests large percentage of students agreed to have faced lack of concentration, have problems in making decisions, have being feeling irritated, angry, fatigued and tired, and highly agreed that everything has been a failure during lockdown days significantly than normal days. Thus, in the time of pandemic it can be hypothesized that dependency on smart-phone, internet and overall increase in screen time has increased wake duration, delayed sleep timings, leading to mental and physical fatigue in young population. There can be numerous mental threats associated with pandemic and social isolation and disrupted sleep wake can bring alterations in the biological clock which govern and regulate almost all physiological processes. The leading evidences suggest that we need to address this subject with proper planning, increased awareness and estimate the benefit/risk of isolation in future.

Ambient temperature affects seasonal timing in migratory birds

Sayantan Sur
University of Delhi

In nature, day and night cycle is indivisible from the temperature cycle: daytime is warmer than the night-time and spring and summer long days are hotter than autumn and winter short days. Consequently, the ambient temperature could be intimately attached with photoperiodically controlled seasonal events. Indeed, a few investigations have shown the impact of temperature on the pace of photoperiodic induction of seasonal events, for example fat accumulation, body mass gain and gonadal development in birds. Recent studies on migratory birds have elucidated the molecular regulation of seasonal events by ambient temperature. Singh and colleagues in 2012 showed that the blackheaded buntings underwent gonadal growth and regression cycle both at low (27°C) and high (40°C) temperatures, but under 40°C daily activity levels were attenuated, fat deposition was reduced and the onset of *Zugunruhe* (night migratory restlessness) was delayed. This was the first study which showed how temperature could modulate photoperiodic induction of migration in buntings. In 2019, two studies were published on redheaded buntings (*Emberiza bruniceps*) which showed how temperature affects testicular maturation and weight gain cycle in birds. In the first study Trivedi and colleagues showed that compared to low temperature (22°C), high temperature (38° C) accelerated the testicular development in the birds. The hypothalamic mRNA levels of *tshb*, *dio2* and *gnrh* werealso upregulated under 38°C which suggested a vital role of thyroid hormone responsive pathway in temperature mediated stimulation of gonads. Contrary to the testicular data the body mass and fat accumulation was upregulated in the low temperature. Few key genes involved in fatty acid biosynthesis (*elovl6*, *scd*, and *dgat2*) and in the regulation of glucose and fat metabolism (*hdac4*, and *foxo1*) were found to be differentially expressed in liver between the two temperature regimes. High temperature (38° C) upregulated fatty acid transport (*fabp3*, and *cd36*) in the muscle. In the latest study of the lab, Sur and colleagues in 2020 showed that high temperature (35° C) advanced *Zugunruhe*, and increased muscle growth in blackheaded buntings. At the molecular level it was found that the mRNA levels of th (rate limiting enzyme of dopamine biosynthesis) was upregulated in both midbrain and hypothalamus under high temperature. This suggested that perhaps ambient temperature alters the dopamine signalling to motivate the birds to migrate early. We also found increased expression of *trpv4* (a temperature sensitive gene which senses high temperature (35-40°C) in both skin and hypothalamus under high temperature. Perhaps, TRPV4 is a key candidate molecule involved in temperature perception and integration in birds. Further studies need to be performed on both these species to know if a critical temperature window exists in these birds similar to a critical photoperiod.

Clock and Cognition

Amaan Buniyaadi
University of Delhi

“Early to bed, early to rise, makes one healthy, wealthy and wise”- A classic poem we all learnt as kids, emphasises the importance of proper rest at proper time for our health and mental well-being. What is it about going to bed at proper time or timing our activities appropriately has to do with us becoming wise and healthy? The answer lies in TIME! Time plays an essential role in biological processes, considering most if not all of them are cyclical in nature. Daily biological processes that recur with approx. a period of 24 hours are termed as 'circadian' rhythms. These circadian rhythms regulate our behaviour, physiology and metabolism, and are driven majorly by the prevailing light-dark cycles in our environment.

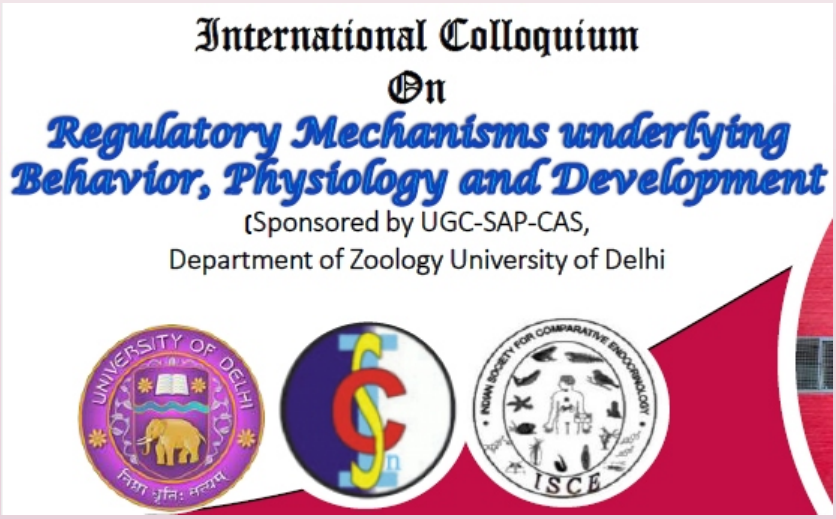
Under an altered light dark cycle, the circadian rhythms are also affected. Since our circadian system influence multiple aspects of our bodily processes, it is not surprising that our cognitive functions are also circadian in nature. For instance, cognitive functions in humans shows a variation over a period of 24 hours, starting off low early in the morning, peaking during the subsequent part of the day till bedtime, but with a trough during the afternoon. The light environment along with appropriate sleep plays an essential regulatory role in these cognitive functions. Studies suggest that a forceful desynchrony between circadian system and light leads to sleep debt which can significantly alter the neural network in different brain areas regulating arousal, vigilance, mood states and working memory in humans. This notion is further solidified by the studies showing students experiencing optimum sleep levels in a dark room, a night before an examination, perform better with much higher grades than compared to the students that stay awake preparing for the exam.

Animal studies focusing on light induced desynchronosis on cognitive performance yields similar results. Rodents exposed to constant light or dim light at night exhibit increased depressive mood states and detrimental effects on their neurophysiology. Findings from diurnal animals such as birds are even more profound. Songbirds exposed to constant light condition shows a decrease in their cognitive performance. There is a decline in the song learning efficiency and song quality in young birds raised in constant light condition or undergoing sleep deprivation. Another study suggests decreased exploration and development of depressive like behaviour in birds due to the presence of light at night. Along with a number of neuronal changes, alterations in the light dark cycles negatively affects the levels of dopamine pathway, a 'feel good' neuropeptide, involved with learning, memory formation Hence, circadian system is essential for our day-to-day cognitive functioning and maintaining a proper rest and sleep regimen is a quintessential prerequisite to maintain it. Though understanding the exact mechanisms by which circadian disruption leads to cognitive decline is a developing field, we still need to understand a whole lot about it.

InSC Events

Virtual Conference At JNCASR

International Colloquium (Hybrid Mode) At Department of Zoology University of Delhi



Motivational Program in Thana Bhawan Shamli

Motivational Program in Jaunpur

Down the memory lane....

Motivating school students

Training faculty and graduate students

Growing together as a team

International Chronobiology conference- 2021: A Spotlight event

In the third week of July, a virtual conference on Chronobiology was organized by Clock club, JNCASR The event was a great success

SAMAY has included a special coverage of the event and we congratulate all the winners and participants

May the learning continues in future with same enthusiasm

Over a century of chronobiology research in India

From the 15-17th of July, the International Conference on Chronobiology brought together scientists from around the world to discuss the latest advances on how organisms, from insects to humans, maintain a diverse range of biological rhythms. This was the third instance in which the conference has been held, previously held in 2012 and 2017, and now establishing a nearly regular quadrennial cycle. This year, the meeting included over 12 keynote speakers from the United States, Australia, Netherlands, United Kingdom, and India. The wide range of geographical locations was further reflected in the high number of attendees. The increasing success of the conference is rooted in a long tradition of high quality chronobiology research conducted in India. One of the highlights of the conference was the final presentation provided by Professor Vinod Kumar that covered the history of chronobiology in India. The presentation provided a beautiful overview of the origins of chronobiology, through to the major advances discovered by leading research laboratories.

The early pioneering Indian scientists such as Sir Jagadish Chandra Bose (FRS), and his research on heliotropic movement, effects of temperature and seasonality in plants was fundamental for the establishment of chronobiology in India. Professor Kumar then elegantly covered the chronology of Indian discoveries in the twentieth century in relation to the founding of the Indian Society for Chronobiology and the DST-SERC School of Chronobiology. Since the beginning of the Indian Society of Chronobiology in 1977, there have been six previous presidents including Professors R.D. Kulkarni (1977-1981), M.K. Chandrashekaran (1981-1994), R. Subbaraj (1994-2000), R. Yegnanarayana (2000-2004), B.N. Joshi (2004-2009), and A.K. Pati (2009-2017) and now with Professor Vinod Kumar (2017-present). The 2021 conference has continued the linear trajectory of excellence in scientific presentations. The conference organizers, Professors Sheeba Vasu and Joanna Chiu created an excellent scientific program and maintained a high quality virtual meeting despite the challenges due to the global pandemic. The meeting was exactly this type of conference that illustrates the depth of research in India and engagement from the international community. As a Life Member of the Indian Society for Chronobiology, I had the pleasure to provide my second keynote presentation. I look forward to attending the next International Conference on Chronobiology.

Tyler Stevenson
University of Glasgow

Congratulations to the winners
Data Blitz Presentation

The intestinal circadian clock as the main driver of microbial rhythmicity

Marjolein Heddes
Technische Universität München

Gut microbiota composition is known to diurnally oscillate in both humans and mice, influenced by environmental conditions, such as food and light. Of relevance, microbial arrhythmicity in mice and humans has been observed in diseases including obesity and diabetes, highlighting the physiological relevance of microbial rhythms. Our research identified that microbial rhythms rely in the circadian system, and determined the peripheral intestinal clock to be the main driver of circadian microbial oscillations and their microbial products. Our results highlight the relevance for further studies to investigate intestinal peripheral clock function in GI diseases in order to develop new treatment strategies.

Exploring the flexibility of fruit fly circadian system using novel light regimes

Pragya Sharma
JNCSAR

To model shift work nocturnal rodents were subjected to light regime with alternating bright and dim light (bright:dim:bright:dim per 24 hours). It was found that activity bifurcates (two comparable bouts of activity in 24 hours) under such light regimes. Over the past decade, these novel light regimes have been used to explore waveform flexibility. Given the current human lifestyle it is crucial to understand the extent of flexibility of activity waveform and what can enable it in organisms of varying temporal niches. There is substantial understanding of the activity pattern and its neuronal substrates in the fruit fly. This along with the genetic tools, makes the fly a valuable model system to provide insights into the organizational principles governing flexibility of the circadian system. When exposed to a similar light regime, we find that *Drosophila melanogaster* shows two major bouts of activity, synchronized to the two dim lit phases. Thus, activity waveform exhibits remarkable flexibility across taxa. We find convincing evidence that this pattern is regulated by the fly circadian clock. We also find that a closely related diurnal species (*Drosophila ananassae*) exhibits a distinct pattern with only one major bout of activity restricted to a bright light phase. Following these observations, we hope to understand how the fly circadian system gives rise to the observed activity pattern.

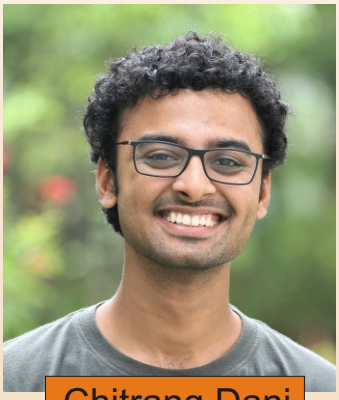
Trainee talks

Clock proteins and training modify exercise capacity in a day time dependent manner

Vaishnavi Dandavate
Weizmann Institute of Science

We tested the time-difference in exercise capacity of wild type and clock mutant mice in constant dark and found that it is circadian clock-controlled. Some clock mutants failed to show time-difference in exercise capacity and varied in their overall performance. We found that BMAL1 impairs, and PERIODs enhance exercise capacity in a temporal manner. These differences correlate to feeding behaviour and liver glycogen. Finally, since exercise capacity responds to training, we tested the effect of scheduled training. We found that training in the late compared to early part of the active phase better improves exercise capacity. Overall, our findings suggest that clock proteins and training are day-time dependent exercise modifiers.

What can we learn about the circadian clock from flies evolving under semi-natural conditions?



Chitrang Dani
JNCASR

As most studies on the evolution of circadian rhythms have been conducted in controlled laboratory settings, little is known about how circadian clocks and rhythms evolve in organisms under naturally variable time-cues. Using fly populations reared under semi-natural conditions at JNCASR for 144 generations, I examined how activity-rest and eclosion rhythms have evolved across laboratory and semi-natural environments. I found that these populations have evolved circadian clocks with highly precise activity-rest rhythm and seasonally varying phase of eclosion which were previously unknown aspects of adaptiveness of clocks. This research aims to inform about pivotal time-cues for flies in naturalistic environments.

Poster Presentation

Chronic caffeine consumption disrupts circadian rhythm in Drosophila melanogaster

Aishwarya Segu
IISER-Thiruvananthapuram

Role of dTRPA1+ and PDF+ neurons in modulating rhythmic activity of flies experiencing constant warm temperature

Aishwarya Iyengar
JNCASR

Circadian clocks control rhythmic behaviours and modulate them in response to environmental factors like light and temperature. I investigated the effect of relatively warm ambient temperature on rhythmic activity-rest behaviour of flies and aimed to trace the neuronal network that integrates thermosensory input with this behaviour. Using neurogenetic manipulations, I examined the role of i. temperature-sensory (dTRPA1+) neurons, and ii. The PDF+ circadian neurons. These together, regulated timing of behaviour under warm temperature. Neuronal pathways explored in this fashion have aided the understanding of related phenomena, like mosquito host-seeking and human pain-sensing, and has been utilized to curb the spread of disease and improve lifestyle of neuropathic patients.

Age dependent experssion of GPCRs and non-visual opsins in songbird telencephalon

Gaurav Majumdar
University of Glasgow

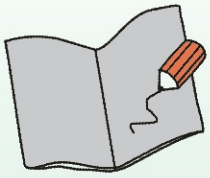
To test if G-protein-coupled receptors (GPCRs) may be involved in the regulation of neuroplasticity of vocal learning in songbirds, we performed transcriptomic profiling of the whole telencephalon of zebra finches sampled at different ages across their development. We found age-dependent expression of melatonin receptors, clock-controlled genes, GPCRs involved in phototransduction including 6 opsins. Encephalopsin showed a significantly higher expression only at 20 dph which coincides with the critical period (period of heightened plasticity) for vocal learning. Based on expression pattern and correlation with other genes, we infer that 1) Light is directly required for neuroplasticity 2) Opsins provide light inputs to the localized circadian clock which regulates onset of the critical period. 3) Light is required for local thyroid/steroidal hormone induction required for neuroplasticity/ development.

Circadian rest-activity rhythm in subject with the risk of OSA

Noorshama Parveen
Pt. R. S. University

Obstructive sleep apnea (OSA) is a sleep-related breathing disorder, in which nocturnal pause and cessation in upper airway of respiration occur that lasts for about 10 seconds and more. Current study was designed to find out the prevalence of OSA among general population of Chhattisgarh and to study the circadian rest-activity rhythm in subjects having risk of OSA. Screening of OSA was done using STOP-BANG and Modified Berlin questionnaires (MBQ) in 983 apparently healthy subjects (470 M and 513 F). Circadian rest-activity rhythm was examined using Actiwatch device in 36 subjects (23 M and 13 F) having risk of OSA and 32 control subjects (16 M and 16 F). The age range was 18y to 80y. All subjects wore Actiwatch device for consecutive 5-8 days. Rhythm parameters (Mesor M, Amplitude A, and Acrophase Ø) were computed using cosinor rhythmometry. The circadian quotient (CQ), peak activity (PA), and rhythm quotient (RQ) were also calculated. The effect of risk of OSA was determined using one-way ANOVA. STOP-BANG questionnaire indicated that 1.12% of subjects were at high risk of OSA, 9.26% at intermediate risk, and 89.62% at low/no risk. However, MBQ indicated that 1.42% of subjects were at high risk, 15.67% at low risk, and 82.91% at no risk of OSA. A statistically significant circadian rhythm in rest activity was obtained in all subjects. The M, A, and PA were significantly declined in OSA subjects than controls. The study postulates that about 17.09% of local population in Chhattisgarh is under risk of OSA. Decreased level of rhythm parameters, mainly M, A, and PA, suggests that rest-activity rhythm tends to deteriorate in OSA subjects.

Chronobiology in news



Chronobiology
Timing is Everything®

Sleep and Physical Activity: Exercise Counteracts Health Effects of Poor Sleep | Jul, 2021
A new study suggests that getting enough physical activity on a regular basis may help mitigate the impact of poor sleep quality.
Find out more
https://www.chronobiology.com/chronobiology-news/

The Best Time to Eat Dinner for Optimal Health | Jul, 2021
Emerging research continues to demonstrate that the last meal of the day should be prior to when your body begins to release melatonin
Read the full article here
https://www.chronobiology.com/chronobiology-news/

Eating Chocolate in the Morning Boosts Fat Burning, Regulates Blood Sugar | Jul, 2021
A recent report suggested that postmenopausal women may be able to enjoy more efficient weight loss and reduce their blood sugar levels throughout the day by eating chocolate in the morning.
Find out more
https://www.chronobiology.com/chronobiology-news/

THE HINDU

Losing Sleep over the Coronavirus Pandemic? | April, 2021
Shweta Akundi talks about how anxiety has been spurred on by the pandemic and how it is affecting our sleep.
Read the full article at
https://www.thehindu.com/sci-tech/health/how-the-covid-19-lockdown-is-changing-our-sleep-cycle/article31432402.ece

TheScientist
EXPLORING LIFE, INSPIRING INNOVATION

Menstrual Cycles Intermittently Sync with Moon Cycles | Feb, 2021
A long-term study sheds new light on the controversial idea that lunar phase influences human reproduction.
Read full article here
https://www.the-scientist.com/news-opinion/68429

Upcoming events

Society for Research on Biological Rhythms 2022- Conference

May 14-18, 2022
Omni Amelia Island Resort,
Amelia Island, Florida
For details, follow the link: https://srbr.org/2022-conference/

European Biological Rhythms Society Congress | 2022- Conference

July 24-28, 2022
University of Zurich
For details, follow the link: https://www.ebrs2022.uzh.ch/

Chronobiology: Gordon Research Conference | 2021

October 10 - 15, 2021
Mount Snow, West Dover, VT, 05356, US
For details, follow the link:
https://www.grc.org/chronobiology-conference/2021/

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Share your feedbacks

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