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ADVERSE EFFECT OF ASTRONOMY AND PHARMACOLOGY DURING ECLIPSE (LUNAR AND SOLAR)

Dr. Dhrubo Jyoti Sen*

School of Pharmacy, Techno India University, Salt Lake City, Sector–V, EM–4, Kolkata–700091, West Bengal, India.

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***Corresponding Author: Dr. Dhrubo Jyoti Sen**

School of Pharmacy, Techno India University, Salt Lake City, Sector–V, EM–4, Kolkata–700091, West Bengal, India.

ABSTRACT

When Earth is positioned precisely between the Moon and Sun, Earth's shadow falls upon the surface of the Moon, dimming it and sometimes turning the lunar surface a striking red over the course of a few hours. Each lunar eclipse is visible from half of Earth. The solar eclipse is one of nature's most stunning events, occurring when the Moon passes between the Earth and the Sun, casting a shadow on our planet. This alignment can partially or completely block the Sun's light, creating a breathtaking sight for observers. The solar eclipse is one of nature's most stunning events, occurring when the Moon passes between the Earth and the Sun, casting a shadow on our planet. This alignment can partially or completely block the Sun's light, creating a breathtaking sight for observers.

KEYWORDS: earth, sun, moon, shadow, umbra, penumbra, melatonin, prolactin, cortisol, eugenol.

INTRODUCTION

An eclipse is an astronomical event which occurs when an astronomical object or spacecraft is temporarily obscured, by passing into the shadow of another body or by having another body pass between it and the viewer. This alignment of three celestial objects is known as a syzygy. An eclipse is the result of either an occultation (completely hidden) or a transit (partially hidden). A "deep eclipse" (or "deep occultation") is when a small astronomical object is behind a bigger one. The term eclipse is most often used to describe either a **solar eclipse**, when the **Moon's shadow** crosses the Earth's surface, or a **lunar eclipse**, when the Moon moves into the **Earth's shadow**. However, it can also refer to such events beyond the Earth–Moon system: for example, a planet moving into the shadow cast by one of its moons, a moon passing into the shadow cast by its host planet, or a moon passing into the shadow of another moon.

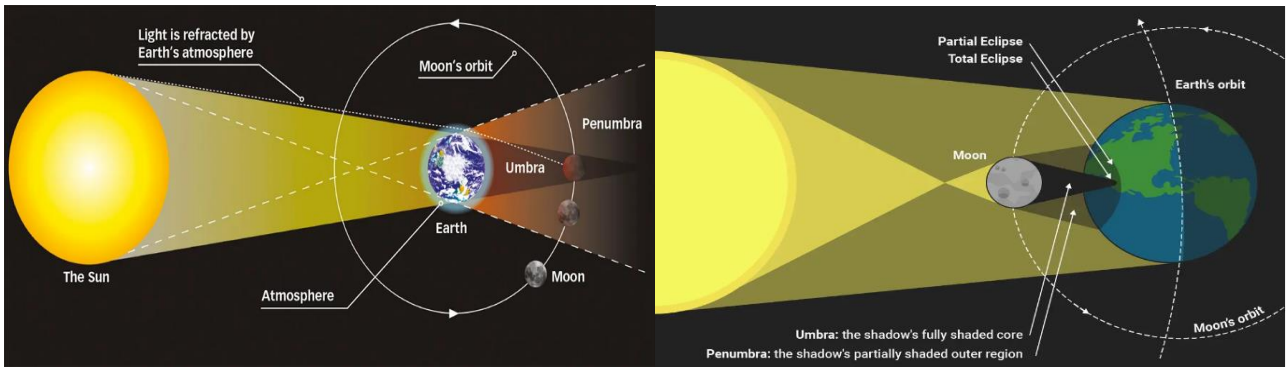

Figure-1: Lunar & Solar eclipse.

There is no scientific evidence of a hormonal imbalance caused by an eclipse, though the changes in light can affect the sleep-regulating hormone melatonin. Some studies have found temporary increases in prolactin in mental patients during a total solar eclipse, but this is not a proven link to hormonal imbalance in the general population. Explanations for perceived effects, like menstrual cycle changes, are generally attributed to

psychological factors such as the cultural significance of eclipses and anticipation, rather than a direct physical cause.[1]

Light Exposure and Melatonin: A solar eclipse causes a significant, albeit temporary, change in natural light, which can affect the body's production of melatonin, a hormone that regulates sleep.

Psychological Factors: The collective experience of an eclipse, including cultural beliefs and personal anticipation, can lead to psychological effects like increased awareness and sleep disturbances. These psychological influences are often stronger than any direct physical effect.

No Proven Link to Menstruation: Despite traditional beliefs, there is no substantial scientific evidence to support a link between lunar eclipses and changes in the menstrual cycle.

Study on Mental Patients: One study found an increase in prolactin levels in institutionalized psychiatric patients during a total solar eclipse, which was associated with behavioral abnormalities. However, this was a specific patient group and not a general finding.

In summary: While the light from an eclipse might influence melatonin, there's no proven direct hormonal impact on the general population. Many claimed effects on the body, such as menstrual irregularities, are likely due to psychological factors or coincidence rather than a physical one.

A lunar eclipse occurs during a full moon and can potentially disrupt melatonin production and sleep quality due to increased light, similar to the full moon's effect. While the exact scientific mechanism isn't fully understood for humans, the bright light from a full or eclipsed moon can inhibit melatonin synthesis, making it harder to fall and stay asleep. Some studies also suggest the lunar cycle might influence circadian rhythms and hormone levels, impacting sleep and potentially other physiological functions in both humans and animals.

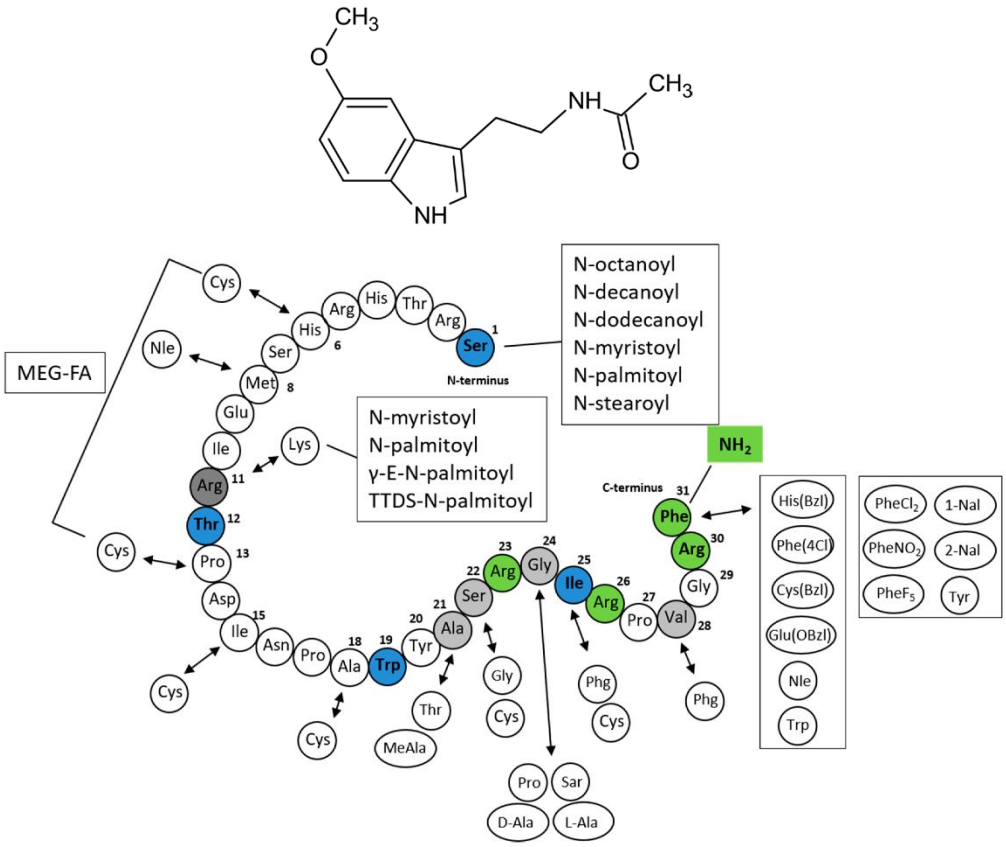

Figure-2: Melatonin & Prolactin.

How a Lunar Eclipse May Affect Melatonin

Bright Light Exposure: A lunar eclipse is a form of increased light at night, as the moon reflects sunlight. Our bodies naturally produce melatonin in response to darkness, with the sleep hormone's synthesis being inhibited by light exposure.

Disrupted Sleep: This increased light intensity can suppress the body's natural production of melatonin, leading to more difficulty falling asleep and staying asleep.

Circadian Rhythm Influence: The moon's brightness, and possibly its subtle gravitational effects, are thought

to influence our circadian rhythms, which are the body's internal clocks that regulate sleep-wake cycles.

Scientific Research and Potential Impacts
Animal Studies: Research has shown that lunar cycles can affect various physiological processes in animals, including melatonin production and the timing of reproductive cycles.

Human Sleep Studies: Studies have linked brighter moon phases to lower melatonin levels, less deep sleep, and longer times to fall asleep in humans.

Unexplored Connections: While a direct causal link in humans is still being explored, some researchers suggest a potential for a "reno-lunar axis" where the lunar cycle might influence fluid balance and kidney function.

Reduce Light Exposure: To minimize the potential effects, try to create a dark sleep environment, even during a full or eclipsed moon.

Maintain Routine: Stick to a consistent sleep schedule to help regulate your internal clock.

Light on Heavy Foods: According to Ayurveda, eclipses can slow digestion, so going light on heavy foods can help your body stay in balance.[2]

A solar eclipse can influence melatonin levels and the sleep-wake cycle because light exposure is a primary regulator of melatonin production, which controls circadian rhythms. The sudden reduction and then return of daylight during an eclipse can disrupt the body's natural hormonal balance, potentially leading to changes in melatonin secretion, though direct scientific studies on this specific phenomenon are limited.

How Light Affects Melatonin
Melatonin and Light: Melatonin is a hormone, primarily produced by the pineal gland that regulates the body's sleep-wake cycle.

Light as a trigger: The synthesis and release of melatonin are highly sensitive to light, particularly changes in its duration and intensity.

Darkness promotes release: Darkness stimulates melatonin production, while bright light suppresses it.

Impact of a Solar Eclipse
Disruption of natural light: A solar eclipse causes a temporary but significant decrease in ambient light.

Melatonin response: This unusual light shift can, in turn, affect the body's neuroendocrine system, potentially influencing melatonin levels.

Circadian rhythm changes: Altered melatonin levels could shift the circadian rhythm (the body's internal clock), which might lead to effects such as changes in sleep patterns, low energy, or mood disturbances.

Scientific Context
Limited research: Direct scientific research on the specific effects of solar eclipses on human melatonin levels is scarce, partly because eclipses are infrequent events.

Existing evidence: Studies on how light exposure affects the body's hormonal balance and circadian rhythm, as well as some early research linking solar eclipses to changes in biochemical parameters and sleep, provide indirect evidence for a potential link.

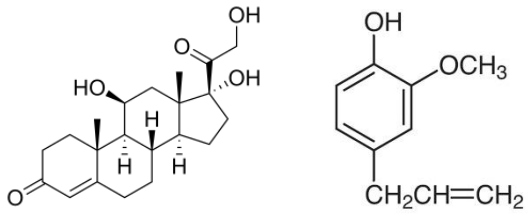

Figure-3: Cortisol & Eugenol.

In essence, the rapid and temporary change in light during a solar eclipse can act as a strong environmental signal, potentially disrupting the natural hormonal processes that govern sleep and wakefulness, including melatonin production.

A study observed increased prolactin levels and associated behavioral abnormalities in a small group of psychotic patients during and immediately after a total solar eclipse, but this was a solar, not a lunar, eclipse, and the effects gradually normalized. Research on lunar eclipses shows that while there are strong cultural beliefs linking them to health and hormonal changes, scientific evidence suggests that any observed effects, such as sleep disturbances or mood shifts, are often psychological, influenced by cultural narratives and anticipation rather than a direct physical impact.[3]

Solar vs. Lunar Eclipse: The observed increase in prolactin was linked to a solar eclipse, not a lunar eclipse.

Psychiatric Patient Study: A study on a small group of treated, symptom-free psychotic patients found that prolactin levels and some behavioral abnormalities increased around a solar eclipse but eventually normalized.

Psychological vs. Physical Effects: While a full moon's gravitational pull can influence animal hormones and tides, there is no evidence that the moon's gravitational force during a lunar eclipse directly impacts human hormone levels like prolactin.

Cultural Influence: Beliefs about lunar eclipses influencing health and well-being are often

psychological, shaped by cultural narratives and **personal anticipation.**

Lack of Evidence for Direct Impact: There is no scientific evidence to suggest that a lunar eclipse causes physical harm or directly affects prolactin levels in the general human population.

A 1981 study of psychotic patients found that prolactin levels increased during and immediately after a total solar eclipse, which was associated with behavioral abnormalities in the patients. However, the mechanism behind this change is unclear, with some suggesting stress or external factors may play a role, while others emphasize the need for more research into the potential physiological impact of such astronomical events on vulnerable individuals.

What the research shows.
Increased prolactin: A study published in the Indian Journal of Psychiatry in 1981 observed an increase in prolactin levels in treated psychotic patients during and after a total solar eclipse.

Behavioral abnormalities: These prolactin changes were linked to behavioral issues in these patients.

Gradual normalization: Both the prolactin levels and the behavioral changes were found to gradually return to normal in the post-eclipse period.

Possible explanations and considerations
Stress response: One hypothesis is that the unusual nature of an eclipse can trigger a stress response, which may increase cortisol and potentially influence prolactin levels.

Hormonal disruption: The sudden change in light during an eclipse could disrupt hormonal balance, although the specific effect on prolactin is not well understood.

Need for more research: The findings highlight a potential connection between solar eclipses, prolactin, and behavioral changes in certain individuals, underscoring the need for further investigation into these phenomena, especially concerning patients with mental illnesses.

There is no scientific evidence for neurohormone imbalance or other direct physical effects on humans due to eclipses. While some individuals may report symptoms like anxiety, sleep disturbances, or fatigue, these are typically considered psychological effects. The observed hormonal changes, such as increased prolactin in psychiatric patients during a solar eclipse, are not representative of the general population and lack scientific consensus regarding any direct link to the eclipse itself.

Potential Physical & Psychological Effects
Hormonal Disruption (Lack of Evidence): Scientific data do not support direct hormonal imbalance in the general population due to eclipses.

Increased Prolactin (Specific Case): One older study found increased prolactin levels and behavioral changes in psychiatric inpatients during a total solar eclipse, but these findings are not replicated or applied to the general population, according to the National Institutes of Health (NIH).

Anxiety and Stress: The unusual and dramatic nature of an eclipse can trigger anxiety or stress in some individuals, which can manifest as insomnia or irritability.

Vivid Dreams: Some people report experiencing vivid dreams, but this is not linked to physical hormonal changes.

NASA Disputes Connection: **NASA has consistently denied any scientific link between eclipses and human health.**
Cultural & Psychological Factors: Psychological impacts are often linked to cultural narratives, cultural interpretations, and pre-existing beliefs or anxiety related to rare celestial events, rather than a physical cause, according to the Times of India.

Light Changes: Solar eclipses primarily affect light exposure, which could theoretically influence the body's circadian rhythm and melatonin production, but this is not directly linked to neurohormone imbalances in humans. During a lunar eclipse, the rays of sunlight filtered and refracted by Earth's atmosphere reach the Moon, causing it to appear dim or reddish. Blue light from the sun is scattered by the atmosphere, while longer-wavelength colors like red and orange are bent (refracted) and continue through the atmosphere to illuminate the Moon. This phenomenon is similar to how light from sunrises and sunsets appears red on Earth.[4]

Earth's shadow: A lunar eclipse happens when the Earth passes between the Sun and the Moon, blocking direct sunlight from reaching the Moon.

Atmospheric filtering: Some sunlight passes through Earth's atmosphere.

Scattering of light: Blue light, which has shorter wavelengths, is scattered more easily by Earth's atmosphere. **Bathochromic shift:** In spectroscopy, the position shift of a peak or signal to longer wavelength (lower energy). Also called a red shift. **Hypsochromic shift**: In spectroscopy it is the shift of a peak or signal to shorter wavelength (higher energy). In spectroscopy, hypsochromic shift is a change of spectral band position in the absorption, reflectance, transmittance, or emission spectrum of a molecule to a shorter wavelength (higher

frequency), blue shift. [400nm……..**VIBGYOR theory**…….800nm]: Violet, Indigo, Blue, Green, Yellow, Orange, and Red.

Refraction of light: Longer wavelengths, such as red and orange light, are bent (refracted) by the atmosphere.

Reddened Moon: This red and orange light then travels to the Moon's surface, giving it a distinct reddish, or even "blood moon," appearance during a total lunar eclipse. The Moon itself is not a light source but reflects sunlight. The "rays" seen during a lunar eclipse are not direct sunlight, but rather light that has been filtered and bent by our planet's atmosphere. The color of the Moon during an eclipse can vary depending on the amount of dust or clouds in Earth's atmosphere.

During a **solar eclipse**, the same harmful ultraviolet (UV) and infrared (IR) radiation comes from the Sun, but the dimming effect tricks your eyes into widening pupils, allowing a more dangerous amount of this radiation to reach the retina. While the amount of UV light doesn't increase, the eye's natural response to less visible light, and the potential for thermal damage from the focused intense light, poses a significant risk to vision.

Misleading Brightness: An eclipse creates a false sense of security, as the sky darkens, tricking your brain into dilating your pupils.

Increased UV Exposure: With the pupils wider, more of the Sun's invisible, high-energy UV radiation enters the eye, causing photochemical damage to the retina.

Thermal Damage: The eye's lens focuses the incoming light, concentrating its intensity and potentially causing thermal burns on the retina.

Lack of Pain Sensors: The retina has no pain receptors, so you wouldn't immediately feel the damage being done.

No Increase in Radiation: The Sun emits UV and IR radiation constantly; the amount does not increase during an eclipse.

Focus on the Corona: Only during a total solar eclipse, when the Sun's disk is completely blocked, is it safe to view the Sun's outer atmosphere (corona) without special filters.

Corona's Radiation: The corona itself emits electromagnetic radiation, which is not harmful to the eyes.

How to Protect Your Eyes

Use Certified Solar Viewers: Only look at an eclipse with specially designed and ISO-certified solar glasses or viewers.

Pinhole Projection: You can also use pinhole cameras or project the sun's image through tree leaves to watch an eclipse safely.

Never Look Directly: Do not look at any part of the sun during a partial eclipse, even for a moment, as it is still very dangerous.

The most dangerous effect of a **solar eclipse** on humans is permanent eye damage, or solar retinopathy, from direct, unprotected viewing of the sun. While the eclipse itself isn't astronomically harmful, the temporary drop in light can disrupt circadian rhythms, potentially affecting sleep and hormones. Psychological effects can range from anxiety due to cultural beliefs to feelings of awe and connection. Safe viewing is crucial to prevent eye injury, and while there are myths, the eclipse does not harm food or cause radiation-related issues.

Eye Damage (Solar Retinopathy): This is the most significant risk. Staring at the sun during an eclipse, even when it's partially obscured, can burn and damage the retina's light-sensitive cells, leading to permanent vision loss, blind spots, and blurred vision.

Respiratory & Skin Health: Reduced sunlight levels may lead to a temporary temperature drop. While high pollution levels can affect air quality, the sun's exposure during an eclipse still carries a risk of harmful UV rays, requiring skin protection.[5]

Physiological & Psychological Effects

Disrupted Circadian Rhythms: The sudden change in light can momentarily confuse the body's internal clock, affecting sleep patterns and hormonal processes.

Psychological Impact: Experiencing the awe and wonder of a solar eclipse can foster a sense of connection and community among people. Conversely, cultural superstitions or historical associations with eclipses can cause anxiety or unease in some individuals.

Myths and Misconceptions

Food Contamination: There is no evidence that food is harmed by the sun's rays during an eclipse.

Radiation from the Eclipse: The radiation from an eclipse is not harmful.

How to Stay Safe

Use Certified Eye Protection: Wear ISO-certified solar eclipse glasses to protect your eyes from harmful rays.

Use Indirect Viewing Methods: Pinhole projectors are a safe way to observe an eclipse indirectly.

Avoid Unsafe Methods: Do not look at the sun through regular sunglasses, cameras, or telescopes without proper solar filters.

Mythology for avoiding Rajasik and Tamasik food during eclipse: non-veg foods [fish, eggs, meat, sea foods] and hallucinogenetic foods [alcohol, cigarette, ganja, drugs] because in non-veg foods protein donot metabolise into amino acids by glooming sun light/moon light and UV rays become enaffend on items and entire protein remains un-metabolised, similarly hallucinogenitic foods effects on brain and sympathetic as well as parasympathetic neurohormons release in frequest amount. The use of tulsi [*Ocimum tenuiflorum*] leaves over food is suggested becaus tulsi contains eugenol which is antibacterial agent which prevents food items to destroy by micrtobial contamination.

CONCLUSION

The altered ionospheric conditions during an eclipse can change how radio waves propagate through the ionosphere. Looking directly at the Sun during an eclipse without proper protection can cause permanent retinal damage, leading to a condition called solar retinopathy. Symptoms include blurred vision, dark spots, and even permanent blindness. Looking directly at the Sun during an eclipse can cause severe damage to the eyes and even blindness. This is because the Sun's UV rays can cause damage to the retina, the part of the eye that receives and processes light. This damage can occur even if the Sun is only partially covered by the Moon. Lunar eclipses usually occur at night, which can impact sleep patterns. Studies suggest that the Moon's brightness and gravitational pull may influence human circadian rhythms, leading to insomnia or restlessness. Many people report experiencing difficulty falling asleep or staying asleep on eclipse nights. It is also suggested to strictly avoid drinking alcohol, smoking cigarettes, and also avoid eggs, meats, and sea foods on the day of the eclipse. Eclipses are widely seen as times of deep spiritual importance. During this period, people often choose to fast, pray, or chant sacred mantras.

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