

The sun, the moon, and renal endocrinology

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Renal endocrinology is a dynamic, and rapidly expanding, subspecialty of both endocrinology and nephrology. Emphasis is being laid upon the kidney as a source of hormones, a source of enzymes which lead to hormone production, a target organ of various renal and non-renal hormones, and a producer/user of autocrine and paracrine factors.^[1] Though the first enzyme linked to hormone production was isolated over a century ago, and thought to be a hormone (renin, by Tigerstedt and Bergman),^[2] the bulk of renal hormones have been discovered in the past few decades. As recently as 1983, a leading medical historian described hormones of the kidney as “new hormones.”^[3] No wonder, then, that renal endocrinology, or endocrine nephrology, is thought of as a budding, ultramodern science. Authors of textbooks and editors of journals have woken up to the challenges and promises of this area of medicine after a long hiatus.^[1,4]

Traditional medicine, on the other hand, may be thought of as the antithesis of modern endocrinology. Various medical systems, including Indian, Chinese, Greek, and Arabic forms of medicine, have been in vogue for many centuries now. All of them are built on experience-based medicine, rather than evidence-based medicine. In contrast to modern medicine, and modern endocrinology, which try to explain the pathophysiology on scientific facts, traditional medicine sometimes relies on the supernatural to explain the etiology of disease.

Many traditional systems of medicine, and religions, have invoked the solar and lunar etiologies of disease. People

have been warned for centuries, for example, not to go out in a solar eclipse or lunar eclipse.

The contribution of the sun and moon to disease is not limited to traditional medicine, however. Though surprising at first glance, these two bodies are linked to renal endocrinology in more than one way. Modern endocrinology understands the effect of these celestial bodies on human health and is sometimes able to use them as treatment as well (as in heliotherapy).^[5]

The correlation of Vitamin D levels with sunlight exposure is well known. Vitamin D deficiency is one of the commonest medical conditions worldwide. Caused by multiple reasons, one of the leading etiologies is lack of exposure to sunlight. This may be due to avoidance of outdoor activities (heliophobia), wearing of body-covering attire, or use of sunscreen creams.^[6]

Vitamin D is synthesized by a non-enzymatic photolysis of provitamin D (7-dehydrocholesterol) to provitamin D, upon exposure of the epidermis to ultraviolet B light (290–315 nm wavelength). Provitamin D is further isomerized to vitamin D₃, which is activated to 25(OH)D₃ in the liver and 1,25(OH)₂D₃ in the kidney.^[6]

Vitamin D status is a marker of overall human health, and vitamin D deficiency is an easily preventable condition with marked public health impact. This aspect of endocrinology, which covers a hormone that needs both the sun and the kidney to achieve its full range of physiological actions, thus brings traditional wisdom and modern biology together.

The association between sunlight and vitamin D should be emphasized by all endocrinologists and nephrologists, who should take the lead in educating other medical professionals.

The moon has long been thought to have major effects on the behavior and physiology of humans as well

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DOI:
10.4103/2230-8210.93730

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as animals. It has been suggested that melatonin and endogenous steroids may mediate cyclic alterations seen in synchronicity with the lunar cycle.^[7] Melatonin is a peptide hormone secreted by the pineal gland. This gland is part of a photo-neuro-endocrine system which follows both a circadian and a seasonal cycle and exhibits multiple effects.^[8]

Recently, work has been done to try and explore a potential reno-pineal axis.

Melatonin has been found to reduce oxidative stress, inflammation, proteinuria, and progression of renal damage in rats with renal ablation.^[9] This is an addition to the earlier known fact that melatonin production is impaired in chronic renal failure.^[10] This finding, however, contrasts with research showing that melatonin reduces renal blood flow.^[11]

The production of melatonin is affected by the lunar cycle in certain animal species.^[12] This may be true in humans as well, through no experimental proof is available. Melatonin production is also reduced by exposure to sunlight. Thus, vitamin D, melatonin, the sun, and the moon do have unexplored interactions with each other.

Authors have reported a correlation of frequency of renal colic with lunar phases. The highest incidence is noted around full moon (days 14–17) while the least incidence of renal colic is at the “extreme days of lunar month.”^[13] Thus, there may exist a potential reno-lunar axis, which needs to be studied in detail by renal endocrinologists. Perhaps the lunar cycle affects fluid balance and changes the concentration of urine in ways that are yet to be understood, to influence of renal function and the frequency of renal colic.

As we continue to discover newer renal hormones and as we keep on finding novel renal effects of classical

hormones, we must keep exploring the biochemical and physiological rationale of so-called “traditional” medicine.

It is possible that one day modern researchers in renal endocrinology may find robust biologic explanations to justify the title of this editorial: The sun, the moon, and renal endocrinology.

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