Submission

Inquiry into Sleep Health Awareness in Australia

The Impact of Artificial Light at Night on Sleep Health

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Summary

- Significant improvement in sleep health could be made by increasing public awareness that excessive artificial lighting at night, particularly in the blue end of the visual spectrum, is associated with poor sleep patterns and multiple medical conditions.

- Excessive exposure to artificial light at night is associated with other diseases including obesity, heart disease, diabetes, breast and prostate cancer

- Entities responsible for providing artificial lighting at night have a responsibility to limit such exposure on the public.

- Businesses that employ night shift workers, should be required to utilize lighting that minimizes the harmful effects or artificial lighting at night.

- Residential institutions such as nursing homes and hospitals should be required to utilize lighting that minimizes the harmful effects or artificial lighting at night.

- An added bonus of limiting artificial light at night is impact on other species, such as insects, migrating birds, night foragers and turtles.

Sleep wake cycles in animals and humans and some plants is controlled by melatonin, a hormone secreted by the brain. Melatonin levels are highest at night and suppressed during the daytime by exposure to blue rich light. In addition to its control of circadian rhythm, melatonin is an anti oxidant and plays a role in the immune system and suppression of tumour growth(1).

Exposure to artificial light, particularly in the blue area of the visual spectrum suppresses melatonin production, and, in turn causes sleep disturbance(2).

The light emitting diode (LED) lighting is becoming universal for electronic , indoor and outdoor lighting. LED lighting is very blue rich compared to more traditional lighting as it is essentially a blue LED with a phosphor coating to give the appearance of white light. Unless LED lighting is specifically filtered to minimize its blue light content it has more effect on Melatonin production and therefore sleep disturbance than more traditional lighting. Common sources of blue rich lights are, laptops, televisions, computer monitors, cool white house lights and cool white outdoor lighting, particularly street lighting (3-5).

The blue content of LEDS is often expressed as a kelvin rating. Where possible artificial lights at night should be rated no higher than 3000K. Ideally they should also have specific blue filters at the frequency that suppresses melatonin. The use of computer programs that decrease blue content on computers, phones and televisions after sunset, is recommended.

Solutions

Public awareness

While many factors contribute to sleep disturbance the raising of awareness of the above issue could be a relatively simple and cheap contribution to improving the nation's sleep health.

Outdoor lighting

While there is the psychological assumption that increased outdoor lighting is beneficial, there is no peer reviewed independent evidence that increasing outdoor lighting levels decreases crime rates, motor vehicle accidents or personal safety. Invariably articles that do support increased lighting suffer from poor scientific design, lack of peer review and/ or funded by lighting manufacturers.

The quality evidence shows that decreasing outdoor and street lighting does not lead to increases in motor vehicle accidents, crime rates or personal assaults(6).

There is a need to have providers of outdoor and public lighting contribute to minimization of exposure to artificial light at night. This was strongly recommended by the report of the American Medical Association(7).

Present standards often describe minimal lighting standards, but none describe maximum lighting standards. There is also a lack of standards requiring outdoor lighting to be sufficiently shielded so as not intrude on sleeping locations.

Occupational lighting
Businesses that employ night shift workers, should be required to utilize lighting that minimizes the harmful effects or artificial lighting at night.

Residential Institutions
Residential institutions such as nursing homes and hospitals, should be required to utilize lighting that minimizes the harmful effects or artificial lighting at night(8).

Since the introduction of the pulse oximeter to non invasively measure oxygen levels inpatients in 1986, there is no longer the imperative to have inpatients kept in a daytime lighting environment 24 hours a day, to detect cyanosed (blue skin) patients with low oxygen levels.

Staff in such institutions are particularly at risk from the damaging effects of suppressed melatonin secretion(9, 10).

Other conditions that would benefit from decreasing exposure to excessive artificial lighting at night.

1. Breast Cancer
   Excessive artificial light is a recognized carcinogen(1, 9-15).
2. Prostate Cancer(2, 11, 14).
3. Obesity(2, 16).
4. Heart Disease(2, 16).
5. Diabetes(2, 16).
6. Depression(8)
7. Macular degeneration (17).
8. Impact on other species(18, 19).
9. Light pollution(20)

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Appendix

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