Darkness and screen light exposure: Its role in psychosocial outcomes among pregnant women in Kuala Lumpur

Kok EY, Chew WL and Satvinder K

Department of Food Science with Nutrition, Faculty of Applied Sciences, UCSI University, Kuala Lumpur, Malaysia

UNDERGRADUATE

INTRODUCTION

- Light exposure at abnormal timings is associated with disruption of circadian rhythm.[1]
- Exposure to artificial light at night is associated with major depression due to circadian disruption. [2]
- Pregnancy is a process where the mother is vulnerable to unfavourable psychosocial factors due to environmental and physiological changes. [3]
- As circadian rhythm acts as an important factor during pregnancy, so light exposure should be studied for better health recommendations.

OBJECTIVE

To determine light exposure risks to psychosocial outcomes among pregnant women.

METHODOLOGY

Prospective observational study

Sampling & Study population
- 13 maternity clinics in Kuala Lumpur selected
- 117 pregnant women with no comorbidities aged 18-39
- Second trimester with single pregnancy

Answer self-administered questionnaires
- Sociodemographic data
- Light exposure assessment (H-LEA)
- Psychosocial factors assessment (DASS-21)

Data analysis
- Spearman's correlation
- Kruskal-Wallis test
- Post hoc Mann-Whitney test
- Binary logistic regression

Type of light, Hours, Lux level → Depression score, Anxiety score, Stress score, Total DAS score

RESULTS AND DISCUSSION

1

72.6% Malay

82.9% Tertiary education level

53.0% Middle* household income level

*RM 2,300 – 5,599

2

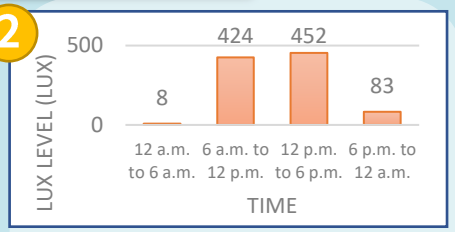

Figure 1 Light exposure at different timings of the day (Lux)

Light exposure peaks at noon then decreases - Consistent with Malaysian weather [4]

Psychosocial outcomes were unfavourable when exposed to screen light. Blue light disrupts circadian rhythm whereby it suppresses sleep and affects mood of a person. [5]

3

Table 1 Mean differences of type of light exposure at different timings with DAS among pregnant women

Time block	Psychosocial factor	Type of light	Median (IQR) (hours)	p-value
12 a.m. – 3 a.m.	Stress	Darkness	6.00 (8)	0.034*
		Screen light	10.00 (10)	
	Anxiety	Darkness	6.00 (6)	0.003**
		Screen light	10.00 (10)	
	Depression	Darkness	4.00 (8)	0.014*
		Screen light	6.00 (6)	
3 a.m. – 6 a.m.	Stress	Darkness	6.00 (8)	0.046*
		Screen light	10.00 (11)	
	Anxiety	Darkness	6.00 (6)	0.024*
		Screen light	11.00 (13)	
6 a.m. – 9 a.m.	Anxiety	Natural light (Indoors)	10.00 (10)	0.009**
		Screen light	4.00 (6)	
9 p.m. – 12 a.m.	Anxiety	Artificial light	8.00 (8)	0.048*
		Screen light	6.00 (8)	

Based on Kruskal-Wallis test and post-hoc Mann Whitney test
DAS= Depression, anxiety, and stress
*Statistically significant at p< 0.05 ** Statistically significant at p< 0.01

4

β=-1.498
p= 0.039*

Longer hours in darkness → **Lower total DAS score**

Based on binary logistic regression
* Statistically significant at p< 0.05

Total darkness in this study represents sleep time, longer sleep duration = better psychosocial factors [6, 7]

5

Indoor natural light
4.93±3.25 hours
ρ = 0.236
p = 0.014*

Higher anxiety score

Darkness
7.51±1.81 hours
ρ = -0.341
p < 0.001**

Reduced sleep duration may increase anxiety levels, particularly in the morning. [8]

Based on Spearman's correlation
* Statistically significant at p< 0.05
** Statistically significant at p< 0.01

CONCLUSION & RECOMMENDATIONS

- Since negative psychosocial outcome was observed among pregnant women with screen light exposure in darkness, its implication to pregnancy progression and outcome should be studied.
- In addition, education and awareness should be made to pregnant women for healthy light exposure for good pregnancy outcomes.

References

[1] Cho, Y., Ryu, S., Lee, B., Kim, K., Lee, E. and Choi, J., 2015. Effects of artificial light at night on human health: A literature review of observational and experimental studies applied to exposure assessment. Chronobiology International, 32(9), pp.1294-1310

[2] Bedrosian, T. and Nelson, R., 2013. Influence of the modern light environment on mood. Molecular Psychiatry, 18(7), pp.751-757.[3] Silva, V., Magalhaes, J. and Duarte, L., 2020. Quality of sleep and anxiety are related to circadian preference in university students. PLOS ONE, 15(9), p.e0238514.

[3] Coutinho, E., Silva, C., Chaves, C., Nelas, P., Parreira, V., Amaral, M. and Duarte, J., 2014. Pregnancy and childbirth: What changes in the lifestyle of women who become mothers?. Revista da Escola de Enfermagem da USP, 48(spe2), pp.17-24.

[4] Tang, C. and Chin, N., 2013. Building Energy Efficiency Technical Guideline for Passive Design. Kuala Lumpur: Building Sector Energy Efficiency Project, Malaysia, p.39.

[5] Bedrosian, T. and Nelson, R., 2017. Timing of light exposure affects mood and brain circuits. Translational Psychiatry, 7(1), pp.e1017-e1017.

[6] Oh, C., Kim, H., No, H., Cho, K. and Chu, M., 2019. The effect of anxiety and depression on sleep quality of individuals with high risk for insomnia: A population-based study. Frontiers in Neurology, 10.

[7] Khorshid, R., Almadani, S., Al shehri, A., Abduljawad, L. and Alsaleh, A., 2021. The effect of fluorescent light on anxiety patients. Cureus,.

[8] Cox, R., Sterba, S., Cole, D., Upender, R. and Olatunji, B., 2018. Time of day effects on the relationship between daily sleep and anxiety: An ecological momentary assessment approach. Behaviour Research and Therapy, 111, pp.44-51.