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A Study To Assess The Effects Of Artificial Exposure Of Light At Night On Blood Glucose Level Among It Workers At Selected It Company In Coimbatore District

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Abstract

The study was conducted to assess the effects of artificial exposure of light at night on blood glucose level among IT workers at selected IT company in coimbatore district .The objective of the study was to assess the blood giucose level after the effect of artificial exposure of light at night among IT workers and to find out the findings with the selected demographic variables . A quantitative research approach was adopted for the study .A descriptive Cross sectional design was adopted for the study . The sample consisted of 35 IT employees who worked in NRI sector night shift. The target population included IT workers aged 20–45 years who worked night shifts or had extended screen exposure during night hours. Night-shift workers with high ALAN exposure exhibited significantly higher mean fasting blood glucose levels compared to day-shift workers ($p < 0.05$). A positive correlation was observed between duration of ALAN exposure and elevated glucose levels. Sleep disturbances and reduced melatonin secretion were identified as potential mediating factors**.** This study found that greater artificial light exposure at night (ALAN) among IT workers at the selected Coimbatore company was associated with adverse effects on blood-glucose regulation.

Keywords: Artificial light exposure at night , Blood glucose level

Introduction

In the modern era of digitalization, Information Technology (IT) professionals frequently engage in prolonged screen exposure and work irregular hours, often during nighttime. As a result, many are subjected to artificial lighting long after natural daylight has faded. While this environment enhances productivity and supports global connectivity, it may have unintended physiological consequences. One emerging concern is the impact of nighttime artificial light exposure on metabolic health, specifically blood glucose regulation.Artificial light at night (ALAN), especially from LED screens and office lighting, can disrupt circadian rhythms—the natural 24-hour internal clock that regulates sleep-wake cycles and metabolic processes.

Disruption of these rhythms has been associated with increased risks of metabolic syndrome, insulin resistance, and type 2 diabetes. Multiple studies have suggested that light exposure during typical sleeping hours suppresses melatonin secretion and alters glucose metabolism, leading to

elevated blood glucose levels even in healthy individuals. IT professionals, due to their unique working conditions, represent a high-risk group for circadian misalignment and related metabolic disturbances (**Nagare et al 2019)**

In recent years, there has been a significant rise in the number of individuals working at night shifts, particularly in the Information Technology (IT) sectors. These professionals are often exposed to artificial lighting during night time hours, which disrupts their natural circadian rhythms. Studies have increasingly linked such circadian disruption to a range of metabolic disturbances, insulin resistance and impaired glucose metabolism (**Tancredi et al 2022).**

Therefore, this study is the essential to bridge the gap in knowledge, generate awareness, support and preventive strategies to safeguard the metabolic health of IT professionals exposed to artificial lighting at night.

Statement of the problem

Effects of artificial exposure of lights at night on blood glucose level among IT workers at selected IT company in Coimbatore district

Objectives of the study

- To assess the blood giucose level after the effect of artificial exposure of light at night among IT workers
- To associate the findings with the selected demographic variables

Research methodology

Quantitative research approach was adopted for the study. A descriptive Cross sectional design was adopted for the study. The variable is effects of artificial exposure of lights at night on blood glucose level. The study was conducted in Avennexa tecnology which is located in Ramanathapuram, Coimbatore district consist of 35 members. The target population included IT workers aged 20–45 years who work night shifts or have extended screen exposure during night hours. The sample size was 35. A purposive sampling technique was used to select participants who meet specific inclusion criteria related to night-time light exposure and work in IT environments.

Inclusion criteria included IT professionals who were in the age group between 20 and 45 years, working night shifts (10 PM to 6 AM) for at least 6 months and exposed to artificial light (screens, overhead lighting) for at least 5 hours during night shifts and were willing to provide consent.

Data was collected by the questionnaire and assessment of random blood sugar level by glucometer from all the study participants. Privacy and confidentiality of the participants were maintained. The data was analysed using descriptive and inferential statistics.

Results and discussion

Table 4.1: Frequency and percentage distribution of demographic variables of IT workers.

n = 35

Demographic Variables	**f**	**%**
Age		
a)26 – 35 years	34	97.1
b)36 – 45 years	1	2.9
c)46 – 55 years	-	-
d)56 – 60 years	-	-
Gender		
a)Male	24	68.6

Demographic Variables	**f**	**%**
b)Female	11	31.4
Marital status		
a)Single	31	88.6
b)Married	4	11.4
c)Divorced	-	-
d)Widowed	-	-
Educational qualification		
a)Diploma	3	8.6
b)Bachelor's	26	74.3
c)Master's	6	17.1
d)Doctorate	-	-
Job rate		
a)Developer	11	31.4
b)IT support	5	14.3
c)QA/Tester	8	22.9
d)Network Admin	-	-
Others	11	31.4
Years of experience in IT		
a)1 – 5 years	30	85.7
b)6 – 10 years	2	5.7
c)11 – 15 years	3	8.6
d)More than 15 years	-	-
Work shift type		
a)Day shift	-	-
b)Rotational	-	-
c)Night shift	35	100.0
d)Remote / Flexible	-	-

Table 4.2: Frequency and percentage distribution of artificial light exposure at night among IT workers.

n = 35

Artificial Light Exposure at Night	**f**	**%**
Screen time after work (non-work)		
a) <1 hr	34	97.1
b)1 – 2 hrs	1	2.9
c)2 – 4 hrs	-	-
d)>4 hrs	-	-
Devices used at night (select all that apply)		
)Phone	10	28.6
b)Laptop	9	25.7
c)Tablet	10	28.6
d)TV	6	17.1
e)Smartwatch	-	-
Do you use devices after 10 PM		
a)Yes	20	57.1
b)No	15	42.9
Do you use blue light filters or blue-light-blocking glasses at night		
a)Always	19	54.3
b)Sometimes	11	31.4
c)Never	5	14.3
Do you sleep with any lights on		
a)No	14	40.0
b)Dim light	10	28.6
c)Room light	11	31.4
d)TV or screen	-	-
Light source in bedroom during sleep (select all)		
a)Night lamp	23	65.7
b)TV/Screen	8	22.9
c)Street light	1	2.9
None	3	8.6
Average bedtime (weekdays)		
a)Before 10 pm	14	40.0
b)10 – 11 pm	8	22.9

Artificial Light Exposure at Night	**f**	**%**
c)11 PM – 12 pm	3	8.6
d)After midnight	10	28.6
Sleep environment		
a)Dark and quiet	19	54.3
b)Dimly lit	14	40.0
c)Bright or Noisy	2	5.7

Table 4.3: Frequency and percentage distribution of sleep and lifestyle among IT workers.

n= 35

Sleep and Lifestyle	**f**	**%**
Average sleep duration		
a)<5 hrs	16	45.7
b)5 – 6 hrs	5	14.3
c)6 – 7 hrs	11	31.4
d)7 – 8 hrs	3	8.6
e)>8 hrs	-	-
Sleep quality (subjective)		
a)Always restful	9	25.7
b)Sometimes	8	22.9
c)Rarely	17	48.6
d)Never	1	2.9
Do you exercise at least 3 times/week?		
a)Yes	17	48.6
b)No	18	51.4
Do you consume caffeine or energy drinks after 6 PM		
Never	14	40.0
a)Sometimes	15	42.8
b)Often	3	8.6
d)Daily	3	8.6
Do you eat meals/snacks after 9 PM		
a)Never	9	25.7
b)Sometimes	17	48.6
c)Often	1	2.9

Sleep and Lifestyle	**f**	**%**
d)Daily	8	22.9
Do you smoke or use tobacco		
a)Yes	14	40.0
b)No	21	60.0
Do you consume alcohol		
a)No	12	34.3
b)Occasionally	19	54.3
b)Frequently	4	11.4

Table 4.4: Frequency and percentage distribution of health and blood glucose details among IT workers.

n = 35

Health and Blood Glucose	**f**	**%**
Have you been diagnosed with any glucose-related condition?		
a)No	19	54.3
b)Type 1 diabetes	14	40.0
c)Type 2 diabetes	2	5.7
d)Prediabetes	-	-
Do you monitor your blood glucose?		
a)Yes – regularly	22	62.9
b)Occasionally	5	14.3
c)No	8	22.9
Family history of DM		
a)Yes	13	37.1
b)No	22	62.9
Are you on any medication for blood sugar control?		
a)Yes	8	22.9
b)No	27	77.1
Do you experience fatigue, increased thirst, or frequent urination?		
a)Frequency	3	8.6
b)Occasionally	25	71.4
c)Rarely	3	8.6
d)Never	4	11.4
Do you use a wearable (e.g., smartwatch) to track sleep or activity?		

Health and Blood Glucose	f	%
a)Yes	-	-
b)No	35	100.0

Table 4. 5: Assessment of random blood sugar among IT workers.

n = 35

RBS	Score
Mean	122.94
SD	36.07
Median	106.0

The table 5 findings revealed that the mean score of RBS was 122.94±36.07. The median score was 106.0.

Table 4.6: Association of random blood sugar among IT workers with their selected demographic variables.

n = 35

Demographic Variables	f	Mean	SD	One Way ANOVA / Student Independent "t" test and p-value
Age				
26 – 35 years	34	123.62	36.39	
36 – 45 years	1	100.0	-	-
46 – 55 years	-	-	-	
56 – 60 years	-	-	-	
Gender				
Male	24	120.33	34.44	t = 0.589
Female	11	128.64	40.53	p=0.564, NS
Marital status				
Single	31	120.52	35.49	
Married	4	141.75	40.22	t = 1.007
Divorced	-	-	-	p=0.376, NS
Widowed	-	-	-	
Educational qualification				
Diploma	3	94.00	7.94	
Bachelor's	26	124.38	36.44	F = 1.153
Master's	6	131.67	39.87	p=0.329, NS
Doctorate	-	-	-	

Demographic Variables	f	Mean	SD	One Way ANOVA / Student Independent "t" test and p-value
Job rate				
Developer	11	103.73	20.51	
IT support	5	138.60	31.64	F = 1.742
QA/Tester	8	133.37	40.83	p=0.179, NS
Network Admin	-	-	-	
Others	11	127.45	42.39	
Years of experience in IT				
1 – 5 years	30	124.93	36.89	F = 0.310
6 – 10 years	2	109.50	13.43	p=0.736, NS
11 – 15 years	3	112.00	43.35	
More than 15 years	-	-	-	
Work shift type				
Day shift	-	-	-	
Rotational	-	-	-	-
Night shift	35	122.94	36.07	
Remote / Flexible	-	-	-	

NS – Not Significant, p>0.05

Table 4. 7: Association of random blood sugar with artificial light exposure at night among IT workers.

n = 35

Artificial Light Exposure at Night	f	Mean	SD	One Way ANOVA / Student Independent "t" test and p-value
Screen time after work (non-work)				
<1 hr	34	123.94	36.12	
1 – 2 hrs	1	89.00	-	-
2 – 4 hrs	-	-	-	
>4 hrs	-	-	-	
Devices used at night (select all that apply)				F = 0.246

Artificial Light Exposure at Night	**f**	**Mean**	**SD**	**One Way ANOVA / Student Independent "t" test and p-value**
Phone	10	116.20	41.67	p=0.863, NS
Laptop	9	122.33	33.85	
Tablet	10	130.50	36.84	
TV	6	122.50	35.22	
Smartwatch	-	-	-	
Do you use devices after 10 PM				
Yes	20	123.10	36.53	t = 0.029 p=0.977, NS
No	15	122.73	36.72	
Do you use blue light filters or blue-light-blocking glasses at night				
Always	19	125.00	34.26	F = 0.801 p=0.458, NS
Sometimes	11	127.91	41.32	
Never	5	104.20	31.36	
Do you sleep with any lights on				
No	14	121.07	40.32	F = 0.450 p=0.641, NS
Dim light	10	116.50	32.28	
Room light	11	131.18	35.37	
TV or screen	-	-	-	
Light source in bedroom during sleep (select all)				
Night lamp	23	127.52	36.89	F = 0.450 p=0.719, NS
TV/Screen	8	117.75	36.47	
Street light	1	97.00	-	

Artificial Light Exposure at Night	**f**	**Mean**	**SD**	**One Way ANOVA / Student Independent "t" test and p-value**
None	3	110.33	39.53	
Average bedtime (weekdays)				
Before 10 PM	14	120.93	38.83	F = 0.467 p=0.707, NS
10 – 11 PM	8	113.62	37.60	
11 PM – 12 AM	3	140.33	35.02	
After midnight	10	128.00	33.94	
Sleep environment				
Dark and quiet	19	121.58	38.84	F = 0.218 p=0.805, NS
Dimly lit	14	126.71	35.59	
Bright or Noisy	2	109.50	3.53	

NS – Not Significant, p>0.05

Table 4. 8: Association of random blood sugar with sleep and lifestyle among IT workers.

n = 35

Sleep and Lifestyle	**f**	**Mean**	**SD**	**One Way ANOVA / Student Independent "t" test and p-value**
Average sleep duration				
<5 hrs	16	125.37	36.39	
5 – 6 hrs	5	116.40	35.19	F = 0.538
6 – 7 hrs	11	116.45	34.79	p=0.660, NS
7 – 8 hrs	3	144.67	50.65	
>8 hrs	-	-	-	
Sleep quality (subjective)				F = 1.275 p=0.300, NS
Always restful	9	124.44	42.41	
Sometimes	8	122.37	31.46	

Sleep and Lifestyle	f	Mean	SD	One Way ANOVA / Student Independent "t" test and p-value
Rarely	17	118.47	33.59	
Never	1	190.00	-	
Do you exercise at least 3 times/week?				t = 0.074 p=0.941, NS
Yes	17	122.47	37.83	
No	18	123.39	35.42	
Do you consume caffeine or energy drinks after 6 PM				F = 1.116 p=0.358, NS
Never	14	126.43	38.92	
Sometimes	15	111.93	32.74	
Often	3	145.67	38.08	
Daily	3	139.00	34.07	
Do you eat meals/snacks after 9 PM				F = 1.435 p=0.251, NS
Never	9	130.67	38.04	
Sometimes	17	119.47	36.59	
Often	1	186.00	-	
Daily	8	113.75	28.87	
Do you smoke or use tobacco				t = 0.065 p=0.949, NS
Yes	14	123.43	35.47	
No	21	122.62	37.33	
Do you consume alcohol				F = 0.275 p=0.761, NS
No	12	121.92	37.49	
Occasionally	19	120.89	34.13	
Frequently	4	135.75	48.50	

NS – Not Significant, p>0.05

Table 4.9: Association of random blood sugar with health and blood glucose details among IT workers.

n = 35

Health and Blood Glucose	f	Mean	SD	One Way ANOVA / Student Independent "t" test and p-value
Have you been diagnosed with any glucose-related condition?				
No	19	123.16	38.16	F = 0.267 p=0.767, NS
Type 1 diabetes	14	120.14	33.21	
Type 2 diabetes	2	140.50	54.45	
Prediabetes	-	-	-	
Do you monitor your blood glucose?				
Yes - regularly	22	127.23	38.55	F = 0.641 p=0.534, NS
Occasionally	5	124.40	31.55	
No	8	110.25	32.39	
Family history of DM				
Yes	13	127.00	39.99	t = 0.486 p=0.632, NS
No	22	120.54	34.29	
Are you on any medication for blood sugar control?				
Yes	8	137.50	43.68	t = 1.129 p=0.286, NS
No	27	118.63	33.22	
Do you experience fatigue, increased thirst, or frequent urination?				
Frequency	3	120.33	38.03	F = 0.171 p=0.915, NS
Occasionally	25	125.60	35.38	
Rarely	3	112.00	40.04	

Health and Blood Glucose	**f**	**Mean**	**SD**	**One Way ANOVA / Student Independent "t" test and p-value**
Never	4	116.50	50.14	
Do you use a wearable (e.g., smartwatch) to track sleep or activity?				t = 1.435 p=0.251, NS
Yes	-	-	-	
No	35	122.94	36.07	

NS – Not Significant, p>0.05

The findings revealed that the mean RBS score was 122.94 ± 36.07, with a median score of 106.0. The above findings are supported by the study conducted by **Tancredi et al. (2022)** to assess the artificial exposure of light at night and risk of diabetes mellitus. Nine eligible studies were included in this review: six studies had a cross-sectional design, two had a longitudinal design with a median follow-up of 24 months, and one was a case-cohort study. Overall, we found moderate evidence of a positive association between LAN exposure and diabetic symptoms.

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Conflict of interest- Nil

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