Chapter 5

RESULTS AND ANALYSIS
STRESS MARKER

**Plasma Corticosterone:**

Animals of FL₁ group showed a significant increase in plasma corticosterone concentration following exposure to fluorescent light. However, a significant decrease was observed following 15 and 30 days of fluorescent light exposure with maximum decrease in the when compared to control FL₁₅ [CL₁₅: 152.00 ± 7.07, FL₁₅ 97.167 ± 1.53, FL₃₀: 124.00 ± 2.83 (p = 0.000)]. LED pre exposure with fluorescent light showed similar change as observed in the FL group. A marked difference was observed in the LL₁₅, which showed a significant increase in the plasma corticosterone when compared to the FL₁₅ group. Though exposure to only LED showed no significant change in plasma corticosterone level in the 1 day group, a significant decrease followed by an increase was observed in the OL₁₅ and OL₃₀ group of animals respectively when compared to the control (Table: 1, Graph 1).

CIRCADIAN MARKER

**Plasma melatonin:**

Plasma melatonin level decreased significantly in both FL and LL group across all the three time points measured when compared to control and this change was dependent on the duration of exposure. The melatonin level decrease in LL group was similar to that of the FL group. OL group showed mild decrease however, it was not statistically significant when compared to control (CL) (Table: 2, Graph 2).
INGESTION PATTERN

**Food intake, water intake, body weight:**

The various exposure protocols used in this study resulted in behavioural changes, which were specific to the nature and duration of exposure. Food intake showed both treatment and duration effect (Table: 3, Graph 3). Food intake in the fluorescent light exposure group showed a significant increase in the FL15 and FL30 group animals when compared to control, with the increase more significant in the FL15 group. LL group showed varied response based on the duration of exposure, i.e., significant decrease in LL15 and increase in LL30 groups when compared to control. These changes observed in the LL groups were significantly different when compared to the FL group but almost identical to the change observed in the OL exposure group irrespective of the duration of exposure.

FL and LL group animals showed similar changes with significant decrease in water intake following 1 day exposure and increase in 15 and 30 days when compared to control. LL group showed increase in water intake when compared to FL in the 30 day group (FL30: 29 ± 1, LL30: 33 ± 1 (p = 0.001). Pattern of change observed in the water intake of the control and OL group were identical, i.e., it decreased in 15 and 30 day group when compared to the 1 day group animals (Table: 4, Graph 4).

Fluorescent light exposure showed highly significant decrease in body weight in 1 day exposure [CL1: 0.43 ± 0.11, FL1: -7.53 ± -2.54 (p = 0.000)]. Gain in body weight observed from the 15 days group was exactly the control weight only by 30 days. LL group animals showed significant decrease in the body weight both in LL1 and LL15 group animals with increase observed in the LL30 group. However, at all these time points the observed changes in the LL groups were significantly different from the control animals and the FL group (except 1 day). It is important to note here that only LED exposure (OL group) did not influence the body weight at in all the three time points studied (Table: 5, Graph 5).
OXIDATIVE STRESS MARKERS

Control vs Fluorescent light:

Fluorescent light exposure resulted in decrease in the antioxidant status, predominantly glutathione system as early as 1 day exposure in almost all the tissues studied when compared to control. Among the antioxidant enzyme system, SOD started to show significant decrease right from 1 day exposure in the liver [CL\textsubscript{1} 36.898±3.067, FL\textsubscript{1} 22.593±3.285 (P = 0.003)]. In the skeletal muscle, changes were significant from the FL\textsubscript{15} group onwards. All the tissues however showed significant decrease following 30 days of exposure. The antioxidant enzyme catalase showed significant decrease in its activity following 1 and 15 days exposure in all the tissues except heart. Similar changes were observed following FL\textsubscript{30} days of exposure too, however not so in the heart and kidney. Decrease in antioxidants level following fluorescent light exposure resulted in increase in the oxidative damage as observed by increase in lipid peroxidation and protein carbonyl in almost all the tissues right from 1 day exposure. This change was time dependent (Table: 6 - 40, Graph: 6 - 40).

Control vs LED pre exposure:

LED pre exposure + fluorescent light exposure in the LL\textsubscript{1} group exhibited the same effect as fluorescent light exposure when compared to control. However, in LL\textsubscript{15} group it showed increase in GSH in heart and kidney. GPX exhibited the same effect in 15 as well 30 days as fluorescent light exposure when compared to control. In LL\textsubscript{30} group, LED pre exposure + fluorescent light exposure resulted in additional increase in GSH in all the tissues except kidney and of SOD in brain, liver and skeletal muscle (Table: 6 - 40, Graph: 6 - 40).

Fluorescent light vs fluorescent light + LED pre exposure:

LED pre exposure + fluorescent light exposure in the LL\textsubscript{1} group did not show any significant variation in the parameters studied except for the decrease in LPO in the
kidney [FL$_{15}$8.926±0.248, LL$_{15}$7.060±0.208 (P = 0.000)]. However, in the LL$_{15}$ and LL$_{30}$ group increase in GSH and SOD levels and decrease in LPO was observed in all the tissues. These changes showed region specific varied response, namely, PC levels decreased in kidney (LL$_{15}$ and LL$_{30}$) and skeletal muscle (LL$_{30}$). And GPX level showed significant increase in the heart and liver of LL$_{30}$ group. Catalase, another key enzyme in the antioxidant system showed significant increase in the brain and kidney of LL$_{30}$ group (Table: 6 - 40, Graph: 6 - 40).

**Control vs only LED exposure:**

Only LED exposure in 1 day as well as 15 days group did not offer any significant variation in the parameters studied when compared to the control group (except SOD in the heart [CL$_{15}$22.347±1.235, OL$_{15}$37.778±0.855 (P = 0.000)] for 15 days group). However, only LED exposure for 30 days resulted in significant increase in antioxidant enzyme catalase and SOD of all the tissues studied (except SOD and catalase in the liver). Only LED exposure for a period of 30 days increased the GSH levels in the brain, heart and kidney. In addition, it also decreased the LPO in brain (Table: 6 - 40, Graph: 6 - 40).

**Effect of fluorescent light/LED light on plasma/hemolysate:**

Increase in LPO in 15, 30 days and decrease in antioxidants following fluorescent light exposure in all days when compared to control except catalase (30 days) was observed. Similar effects were observed for 1 day and 15 days except increase in SOD (of FL$_{15}$ group). FL$_{30}$ group showed no change in LPO and SOD but increase in GSH and catalase level when compared with both control and LED pre exposure group. Decrease in LPO, increase in SOD and GSH and no change catalase and GPX level in 15 and 30 days were observed when fluorescent light exposure and LED pre exposure + fluorescent light exposure were compared. Only LED exposure showed increase of SOD in OL$_{15}$ and LPO, SOD, GSH and catalase in OL$_{30}$ group (Table: 6 - 40, Graph: 6 - 40).
CELLULAR ENZYMES

**Na⁺ - K⁺ ATPase:**

Fluorescent light exposure resulted in a significant decrease in Na⁺ - K⁺ ATPase level in brain and skeletal muscle of FL₁ and in all the tissues of FL₁₅ group. In contrast, it increased in all the organs of FL₃₀ group when compared to control. Na⁺ - K⁺ ATPase level in all the tissues of the LED pre exposure group resulted in significant increase in LL₁ (except skeletal muscle) and LL₃₀ group. In the heart, kidney and liver a decrease in the Na⁺ - K⁺ ATPase level was observed in the LL₁₅ group when compared to the control animals. Comparison of change observed in LL with FL group showed a significant increase in Na⁺ - K⁺ ATPase levels at all the time points in all the tissues of LL group. Brain of LL₁₅ and LL₃₀ group where similar to the change observed in FL group. OL₃₀ days showed a significant increase in the enzyme in all the tissues (except skeletal muscle) when compared to control (Table: 41 - 45, Graph: 41 - 45).

**Ca²⁺ ATPase:**

Fluorescent light exposure resulted in decreased in Ca²⁺ ATPase concentration in almost all the tissues in FL₁ and FL₁₅ groups (except kidney), however, there was an increase in its level in all the tissues of FL₃₀ group when compared to control. LL group showed an increase in the enzyme level in all the tissues in only in LL₃₀ group when compared to control. This increase in the LL₃₀ group was significantly higher to the increase observed in FL₃₀ group in almost all the tissues studied. The enzyme level of OL group showed an increase in the brain and kidney of OL₁₅ and in all the organs of the OL₃₀ group when compared to control (Table: 46 – 50, Graph: 46 - 50).

**Cytochrome c oxidase:**

Cytochrome c oxidase level did not show any significant change in fluorescent light exposed group except for the significant decrease observed in the brain of FL₁ group. LED pre exposure showed a significant increase in the enzyme level in all the
organs of LL_{15} and LL_{30} groups compared to control. An increase was observed in the brain, liver and skeletal muscle of the LL_{1} group. These changes were significantly higher at all time points in all the tissue studied when compared with the FL group except kidney of 1 day group. LED exposure per se, as seen in the OL group, resulted in a significant increase in the enzyme level in all the organs of the 30-day group when compared with the control animals (Table: 51 - 55, Graph: 51 - 55).
BEHAVIOURAL STUDY

Spontaneous motor activity and Motor co – ordination

Increase in the spontaneous motor activity was observed in fluorescent light exposed group as well as LED pre exposed group when compared to control at all the three points studied (Table: 56, Graph: 56). OL group animals did not show any variation in their spontaneous motor activity when compared to the control animals.

Motor coordination as assessed by the rota rod test showed a gradual increase in their rota rod balancing time with duration of assessment in the control group (Table: 57, Graph: 57). FL and LL group showed a significant decrease at all the three time points when compared to the controls. Though, both group animals showed an increase in the duration on their rota rod, by 15 days they were significantly lower when compared to the control animals. By 30 days of LED pre exposure LL30 group animals showed a near control value. In contrast, it was interesting to note, that FL30 group animals showed a decrease which was significantly lower than FL1 [(FL1 56 ± 2, FL30 49 ± 4 (p = 0.000)].

Of importance in this test is the observed increase in the rota rod performance of the OL group animals, which were significantly higher when compared to the control animals in both the 15 and 30 day group.

NEUROTRANSMITTER AND ENZYME ASSAY

Serotonin, Dopamine, Noradrenaline and Adrenaline:

Serotonin level of cerebral cortex and visual cortex showed a significant increase in both the FL and LL group of 1 day and 15 days exposure with no significant change in the 30 day group when compared to the control animals (Table: 58,59 Graph: 58,59). FL group animals showed a decrease in noradrenaline (FL15 and FL30) and dopamine (FL1 and FL15) with an increase in the adrenaline level in both cerebral cortex and visual cortex of FL1. Similar changes were observed in the LL group. However, dopamine
level alone showed a significant increase in \( \text{LL}_{30} \) as well as \( \text{OL}_{30} \) group (Table 60 - 65 Graph: 60 - 65)

**Acetylcholine esterase:**

Fluorescent light as well as LED light pre exposure increased the acetylcholine esterase level starting from 1 day in the brain when compared to control. It showed further increase in almost all the other tissues in 15 and 30 days group (Table: 66 - 70, Graph: 66- 70). Increase observed in the LL group was significantly higher when compared to the FL group. The enzyme level in the OL group showed significant increase in all the tissues of \( \text{OL}_{15} \) and \( \text{OL}_{30} \) group when compared to control.
RETINAL HISTOPATHOLOGY (155)

**Total retinal thickness, Outer nuclear layer thickness, Outer nuclear layer cell count:**

Morphologic evaluation of total thickness, outer nuclear thickness and cell count were performed by quantitative histology (Figure: 9 – 12). Exposure to fluorescent light for a period of 15 and 30 days significantly reduced the thickness of ONL [FL15 (p=0.02, Kruskal-Wallis test), FL30 (p=0.02, Kruskal-Wallis test)]. In addition, reduction in the total retinal thickness was observed when compared to control animals [FL15 (p=0.02, Kruskal-Wallis test), FL30 (p=0.02, Kruskal-Wallis test)]. In LL group, there was a significant reduction in ONL thickness in both LL15 and LL30 when compared to control [LL15 (p=0.02, Kruskal-Wallis test), LL30 (p=0.04, Kruskal-Wallis test)]. When LL [LL15 and 30] group were compared with respective FL group, an increase in ONL thickness was observed, however this was statistically not significant. A significant increase in the number of cells in the ONL of 15 as well as 30 days [LL15 (p=0.04, Kruskal-Wallis test), LL30 (p=0.05, Kruskal-Wallis test)] and increase in total retinal thickness [LL30 (p=0.02, Kruskal-Wallis test)] were observed in the LL group when compared to FL group. In the animals exposed to only LED for 30 days, a significant increase in the ONL cell count was observed (p=0.05, Kruskal-Wallis test). However, this did not significantly affect the thickness of the ONL or the total retinal thickness (Table: 71, 72. Graph: 71, 72).
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at $p < 0.05$

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $^*$ denotes comparison with their respective 1 day group
- $@$ denotes comparison between their respective 15 and 30 days group

### TABLE: 1 - PLASMA CORTICOSTERONE (ng/ml)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>152.00±7.07</td>
<td>183.67±12.50*</td>
<td>180.67±3.33*</td>
<td>149.50±4.44</td>
</tr>
<tr>
<td>15 days</td>
<td>152.00 ±7.07</td>
<td>97.167 ±1.32*</td>
<td>180 ±1.32*</td>
<td>138.67 ±4.25*</td>
</tr>
<tr>
<td>30 days</td>
<td>152.00 ±7.07</td>
<td>124.00±2.83*</td>
<td>118.25±1.77*</td>
<td>264.75±0.35*</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 2 - PLASMA MELATONIN (pg/ml)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>46.68±3.31</td>
<td>39.49±2.29*</td>
<td>39.36±2.15*</td>
<td>42.07±2.70</td>
</tr>
<tr>
<td>15 days</td>
<td>46.68±3.31</td>
<td>29.77±0.83*$^$</td>
<td>31.84±2.76*$^$</td>
<td>42.44±3.78</td>
</tr>
<tr>
<td>30 days</td>
<td>46.68±3.31</td>
<td>29.95±1.18*$^$</td>
<td>29.17±0.37*$^$</td>
<td>43.83±0.97</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant.
Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- #denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- \(^\$\)denotes comparison with their respective 1 day group
- \(^\#\)denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 4 - WATER INTAKE (ml)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>41±2</td>
<td>25±2*</td>
<td>29±1*</td>
<td>41±2</td>
</tr>
<tr>
<td>15 days</td>
<td>23±1$</td>
<td>32±1*</td>
<td>32±1*</td>
<td>24±1$</td>
</tr>
<tr>
<td>30 days</td>
<td>26±1$@</td>
<td>29±1*</td>
<td>33±1*#</td>
<td>25±1$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
* denotes significant difference with CL
# denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group

TABLE: 5 - BODY WEIGHT (Change in body weight in gm)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>0.43±0.11</td>
<td>-7.53±2.54*</td>
<td>-7.37±2.52*</td>
<td>3.07±1.10</td>
</tr>
<tr>
<td>15 days</td>
<td>20.70±1.50$</td>
<td>4.13±1.85*$</td>
<td>-5.00 ±1.73*$#</td>
<td>16.73±3.90$</td>
</tr>
<tr>
<td>30 days</td>
<td>37.37±1.29$@</td>
<td>32.00±5.20$@</td>
<td>20.00±3.47$@#</td>
<td>34.40±2.12$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals. 

Groups:
CL- control
FL- fluorescent light exposed group
LL- LED pre exposure + fluorescent light exposed group
OL- only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant.
Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
* denotes significant difference with CL
# denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group

<p>| TABLE: 6 - PLASMA LIPID PEROXIDATION (µmols of MDA/ml of plasma) |
|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>7.482±0.574</td>
<td>6.826±0.154</td>
<td>6.796±0.338</td>
<td>7.774±0.551</td>
</tr>
<tr>
<td>15 days</td>
<td>7.482±0.574</td>
<td>16.599±0.226*</td>
<td>11.975±0.358**$</td>
<td>7.745±0.225</td>
</tr>
<tr>
<td>30 days</td>
<td>7.482±0.574</td>
<td>13.419±0.832*$@</td>
<td>6.637±0.458#$@</td>
<td>5.747±0.199*$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 7 - BRAIN LIPID PEROXIDATION (µmols of MDA/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>6.870±0.174</td>
<td>7.132±0.267</td>
<td>6.972±0.754</td>
<td>7.060±0.483</td>
</tr>
<tr>
<td>15 days</td>
<td>6.870±0.174</td>
<td>15.257±0.440*$</td>
<td>8.226±0.749*# $</td>
<td>6.111±0.299$</td>
</tr>
<tr>
<td>30 days</td>
<td>6.870±0.174</td>
<td>12.398±0.175*$@</td>
<td>11.391±0.335*#@$</td>
<td>6.155±0.181*$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

**TABLE: 8 - HEART LIPID PEROXIDATION (µmols of MDA/ml of homogenate)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>6.520±0.271</td>
<td>6.214±0.139</td>
<td>6.330±0.417</td>
<td>6.666±0.129</td>
</tr>
<tr>
<td>15 days</td>
<td>6.520±0.271</td>
<td>14.498±0.443*$</td>
<td>7.541±0.279**$</td>
<td>6.593±0.404</td>
</tr>
<tr>
<td>30 days</td>
<td>6.520±0.271</td>
<td>14.571±0.525*$</td>
<td>9.422±0.514**$@</td>
<td>6.399±0.174</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 9 - KIDNEY LIPID PEROXIDATION (µmols of MDA/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>7.293±0.415</td>
<td>8.926±0.248*</td>
<td>7.060±0.208#</td>
<td>6.884±0.126</td>
</tr>
<tr>
<td>15 days</td>
<td>7.293±0.415</td>
<td>8.795±0.161*</td>
<td>6.826±0.404#</td>
<td>6.651±0.126</td>
</tr>
<tr>
<td>30 days</td>
<td>7.293±0.415</td>
<td>14.119±0.434*@$</td>
<td>11.348±0.259*@$</td>
<td>6.680±0.259</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
CL- control
FL- fluorescent light exposed group
LL- LED pre exposure + fluorescent light exposed group
OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
* denotes significant difference with CL
# denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- $^*$ denotes significant difference with CL
- $^\#$ denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $^s$ denotes comparison with their respective 1 day group
- $^@$ denotes comparison between their respective 15 and 30 days group

### TABLE: 12 - BRAIN PROTEIN CARBONYL (nmoles/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.850±0.013</td>
<td>1.830±0.010</td>
<td>1.950±0.078</td>
<td>1.914±0.224</td>
</tr>
<tr>
<td>15 days</td>
<td>1.850±0.013</td>
<td>1.961±0.072</td>
<td>1.894±0.082</td>
<td>1.897±0.010</td>
</tr>
<tr>
<td>30 days</td>
<td>1.850±0.013</td>
<td>2.133±0.015*$^s$</td>
<td>2.141±0.027*$^s^@$</td>
<td>1.783±0.026</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

**Groups:**
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- #denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $denotes comparison with their respective 1 day group
- @denotes comparison between their respective 15 and 30 days group

**TABLE: 13 - HEART PROTEIN CARBONYL (nmoles/ml of homogenate)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>0.669±0.020</td>
<td>0.638±0.025</td>
<td>0.642±0.019</td>
<td>0.669±0.028</td>
</tr>
<tr>
<td>15 days</td>
<td>0.669±0.020</td>
<td>0.901±0.010  *$</td>
<td>0.877±0.028  *$</td>
<td>0.621±0.037</td>
</tr>
<tr>
<td>30 days</td>
<td>0.669±0.020</td>
<td>0.684±0.027  @$</td>
<td>0.636±0.017  @$</td>
<td>0.590±0.011  @$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- $ denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- * denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

**TABLE: 15 - LIVER PROTEIN CARBONYL (nmoles/ml of homogenate)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>0.520±0.020</td>
<td>0.477±0.036</td>
<td>0.495±0.027</td>
<td>0.517±0.013</td>
</tr>
<tr>
<td>15 days</td>
<td>0.520±0.020</td>
<td>0.672±0.006*</td>
<td>0.686±0.034*</td>
<td>0.521±0.017</td>
</tr>
<tr>
<td>30 days</td>
<td>0.520±0.020</td>
<td>0.824±0.088*$@</td>
<td>0.761±0.042*$@</td>
<td>0.464±0.112</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- @ denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- § denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
* denotes significant difference with CL
# denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group

**TABLE: 17 – BLOOD REDUCED GLUTATHIONE (µg/ml of hemolysate)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>19.092±0.413</td>
<td>14.502±1.631$</td>
<td>16.227±1.855*</td>
<td>18.669±0.800</td>
</tr>
<tr>
<td>15 days</td>
<td>19.092±0.413</td>
<td>9.359±1.197$</td>
<td>22.689±2.281*#</td>
<td>19.238±0.347</td>
</tr>
<tr>
<td>30 days</td>
<td>19.092±0.413</td>
<td>15.406±0.591$</td>
<td>25.629±0.418*#</td>
<td>23.293±0.922*$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: BRAIN REDUCED GLUTATHIONE (µg/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>11.865±0.262</td>
<td>9.229±1.235*</td>
<td>9.131±1.060*</td>
<td>11.507±0.618</td>
</tr>
<tr>
<td>15 days</td>
<td>11.865±0.262</td>
<td>7.048±0.354*$</td>
<td>16.683±1.072*#$</td>
<td>11.605±0.246</td>
</tr>
<tr>
<td>30 days</td>
<td>11.865±0.262</td>
<td>10.726±0.450*#@</td>
<td>23.177±0.119*#@$</td>
<td>13.346±0.138*#@$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL- LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 19 - HEART REDUCED GLUTATHIONE (µg/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 day</strong></td>
<td>36.833±1.334</td>
<td>17.448±2.055$^*$</td>
<td>17.301±2.317$^*$</td>
<td>36.182±1.199</td>
</tr>
<tr>
<td><strong>15 days</strong></td>
<td>36.833±1.334</td>
<td>27.588±1.044$^*$</td>
<td>50.049±1.610$^<em>$$^</em>$</td>
<td>36.751±1.454</td>
</tr>
<tr>
<td><strong>30 days</strong></td>
<td>36.833±1.334</td>
<td>26.812±1.665$^*$</td>
<td>59.629±0.565$^<em>$$^</em>$$^<em>$$^</em>$</td>
<td>40.333±2.096$^<em>$$^</em>$$^*$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD
Each group consisted of 6 animals.
CL- control, FL- fluorescent light exposed group, LL- LED pre exposure + fluorescent light exposed group and OL - only LED exposed group
ANOVA was performed and followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance set at p<0.05

**Comparison between groups:**
* denotes significant difference with CL
*# denotes significant difference between FL and LL

**Effect of Time:**
* denotes comparison with their respective 1 day group
*# denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals.

**Groups:**
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

<table>
<thead>
<tr>
<th>Groups</th>
<th>1 day</th>
<th>15 days</th>
<th>30 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL</td>
<td>29.948±1.033</td>
<td>29.370±0.423</td>
<td>27.976±1.869</td>
</tr>
<tr>
<td>FL</td>
<td>29.370±0.423</td>
<td>26.774±0.354*</td>
<td>21.425±0.412*</td>
</tr>
<tr>
<td>LL</td>
<td>27.976±1.869</td>
<td>32.861±0.329*</td>
<td>33.160±0.282*</td>
</tr>
<tr>
<td>OL</td>
<td>29.097±0.514</td>
<td>29.346±2.533</td>
<td>29.187±0.259</td>
</tr>
</tbody>
</table>

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
* denotes significant difference with CL
# denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals
Groups:

CL - control
FL - fluorescent light exposed group
LL - LED pre exposure + fluorescent light exposed group
OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:

* denotes significant difference with CL
# denotes significant difference between FL and LL

Effect of Time denoted by superscripts:

$ denotes comparison with their respective 1 day group
$ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- † denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- ‡ denotes comparison with their respective 1 day group
- ‡ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>0.741±0.049</td>
<td>0.525±0.105*</td>
<td>0.519±0.111*</td>
<td>0.858±0.028</td>
</tr>
<tr>
<td>15 days</td>
<td>0.741±0.049</td>
<td>0.216±0.028*</td>
<td>0.302±0.084*</td>
<td>0.636±0.113</td>
</tr>
<tr>
<td>30 days</td>
<td>0.741±0.049</td>
<td>0.372±0.183*</td>
<td>0.350±0.044*</td>
<td>0.926±0.134</td>
</tr>
</tbody>
</table>

**TABLE: 24 – BRAIN GLUTATHIONE PEROXIDASE**

(µg GSH utilized/min/ml of homogenate)
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**

- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**

- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- @ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 29 – BLOOD SUPEROXIDE DISMUTASE
(50% inhibition of pyrogallol auto oxidation/min/ml of hemolysate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>27.037±1.418</td>
<td>14.074±1.913*</td>
<td>15.926±3.285*</td>
<td>28.148±1.210</td>
</tr>
<tr>
<td>15 days</td>
<td>27.037±1.418</td>
<td>21.481±0.855*</td>
<td>42.963±1.711*</td>
<td>31.111±1.711*</td>
</tr>
<tr>
<td>30 days</td>
<td>27.037±1.418</td>
<td>17.574±1.211*</td>
<td>52.482±3.2891*</td>
<td>32.259±4.271*</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- * denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

**TABLE: 30 – BRAIN SUPEROXIDE DISMUTASE**
(50% inhibition of pyrogallol auto oxidation/min/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 days</td>
<td>26.296±2.222</td>
<td>24.444±0.855$^S$</td>
<td>33.704±2.222$^S$</td>
<td>29.259±2.804</td>
</tr>
<tr>
<td>30 days</td>
<td>26.296±2.222</td>
<td>17.100±1.510$^{**}$</td>
<td>41.100±4.530$^{**}$</td>
<td>39.900±5.745$^{**}$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD
Each group consisted of 6 animals.
CL- control, FL- fluorescent light exposed group, LL- LED pre exposure + fluorescent light exposed group and OL- only LED exposed group
ANOVA was performed and followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance set at p<0.05

**Comparison between groups:**
* denotes significant difference with CL
* denotes significant difference between FL and LL

**Effect of Time:**
$ denotes comparison with their respective 1 day group
* denotes comparison between their respective 15 and 30 days group

### TABLE: 32 – KIDNEY SUPEROXIDE DISMUTASE
(50% inhibition of pyrogalol auto oxidation/min/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>25.593±1.298</td>
<td>26.167±0.333</td>
<td>27.241±2.650</td>
<td>28.815±1.532</td>
</tr>
<tr>
<td>15 days</td>
<td>25.593±1.298</td>
<td>21.481±0.855</td>
<td>40.000±5.132</td>
<td>28.889±0.855</td>
</tr>
<tr>
<td>30 days</td>
<td>25.593±1.298</td>
<td>21.519±2.927</td>
<td>35.044±4.318</td>
<td>39.963±1.587</td>
</tr>
</tbody>
</table>

$ denotes comparison with their respective 1 day group
* denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- †denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- ‡denotes comparison with their respective 1 day group
- ‡‡denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL (50% inhibition of pyrogallol auto oxidation/min/ml of homogenate)</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 days</td>
<td>36.898±3.067</td>
<td>18.519±0.855*</td>
<td>22.963±2.566*</td>
<td>34.074±3.421</td>
</tr>
<tr>
<td>30 days</td>
<td>36.898±3.067</td>
<td>23.822±2.133* ‡</td>
<td>46.578±5.369* ‡‡</td>
<td>43.022±3.740‡‡</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- $ denotes comparison between their respective 15 and 30 days group

### TABLE: 34 – SKELETAL MUSCLE SUPEROXIDE DISMUTASE
(50% inhibition of pyrogallol auto oxidation/min/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 days</td>
<td>26.259±2.182</td>
<td>18.519±0.855*</td>
<td>41.111±1.418*#$</td>
<td>27.407±1.913</td>
</tr>
<tr>
<td>30 days</td>
<td>26.259±2.182</td>
<td>20.278±1.078*</td>
<td>44.157±1.950*#</td>
<td>42.226±2.979*$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
CL- control
FL- fluorescent light exposed group
LL- LED pre exposure + fluorescent light exposed group
OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
*denotes significant difference with CL
^denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
*denotes comparison with their respective 1 day group
^denotes comparison between their respective 15 and 30 days group

**TABLE: 35 – BLOOD CATALASE (µmoles H₂O₂ utilized/min/ml of hemolysate)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.876±0.195</td>
<td>1.260±0.127</td>
<td>1.547±0.024</td>
<td>1.771±0.141</td>
</tr>
<tr>
<td>15 days</td>
<td>1.876±0.044</td>
<td>1.185±0.172</td>
<td>1.520±0.308</td>
<td>1.962±0.377</td>
</tr>
<tr>
<td>30 days</td>
<td>1.876±0.044</td>
<td>1.141±0.193</td>
<td>1.238±0.220</td>
<td>3.635±0.208</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

**TABLE: 36 – BRAIN CATALASE (µmoles H₂O₂ utilized/min/ml of homogenate)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.562±0.044</td>
<td>1.064±0.085*</td>
<td>1.073±0.173*</td>
<td>1.499±0.205</td>
</tr>
<tr>
<td>15 days</td>
<td>1.562±0.044</td>
<td>1.174±0.156*</td>
<td>1.056±0.034*</td>
<td>1.417±0.024</td>
</tr>
<tr>
<td>30 days</td>
<td>1.562±0.044</td>
<td>1.047±0.101*</td>
<td>1.528±0.213##@</td>
<td>2.550±0.253##@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

**Groups:**
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

**Level of significance was set at p<0.05**

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

Table: 38 – KIDNEY CATALASE (µmoles H₂O₂ utilized/min/ml of homogenate)

<table>
<thead>
<tr>
<th></th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.909±0.171</td>
<td>0.758±0.109*</td>
<td>0.730±0.023*</td>
<td>1.910±0.058</td>
</tr>
<tr>
<td>15 days</td>
<td>1.909±0.171</td>
<td>1.097±0.062$</td>
<td>1.460±0.233#$</td>
<td>1.905±0.033</td>
</tr>
<tr>
<td>30 days</td>
<td>1.909±0.171</td>
<td>1.211±0.108$@</td>
<td>1.389±0.215$</td>
<td>3.314±0.371$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals. Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- $^*$ denotes significant difference with CL
- $^\#$ denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $^\times$ denotes comparison with their respective 1 day group
- $^\circ$ denotes comparison between their respective 15 and 30 days group

### TABLE: 39 – LIVER CATALASE (µmoles H$_2$O$_2$ utilized/min/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 day</strong></td>
<td>2.241±0.039</td>
<td>1.238±0.256$^*$</td>
<td>1.357±0.147$^*$</td>
<td>2.115±0.244</td>
</tr>
<tr>
<td><strong>15 days</strong></td>
<td>2.241±0.039</td>
<td>1.681±0.257$^*$</td>
<td>1.723±0.061$^#$</td>
<td>2.136±0.041</td>
</tr>
<tr>
<td><strong>30 days</strong></td>
<td>2.241±0.039</td>
<td>1.240±0.269$^*$</td>
<td>1.490±0.154$^\times$</td>
<td>2.028±0.324$^\circ$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- ‡ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL (µmoles phosphorous liberated/min/ml of homogenate)</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>4.487±0.069</td>
<td></td>
<td>6.243±0.202 #</td>
<td>4.789±0.165</td>
</tr>
<tr>
<td>15 days</td>
<td>4.487±0.069</td>
<td>2.919±0.193 $</td>
<td>2.934±0.272 $</td>
<td>4.527±0.060</td>
</tr>
<tr>
<td>30 days</td>
<td>4.487±0.069</td>
<td>6.972±0.196 $@</td>
<td>7.063±0.101 $@</td>
<td>7.432±0.192 $@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- @ denotes comparison with their respective 1 day group
- $ denotes comparison between their respective 15 and 30 days group

---

**TABLE: 42 – HEART Na\(^+\) - K\(^+\) ATPase**

(µmoles phosphorous liberated /min/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>4.612±0.316</td>
<td>3.840±0.397</td>
<td>6.888±0.982*#</td>
<td>4.748±0.200</td>
</tr>
<tr>
<td>15 days</td>
<td>4.612±0.316</td>
<td>2.838±0.199*$</td>
<td>3.453±0.140*# $</td>
<td>4.338±0.139</td>
</tr>
<tr>
<td>30 days</td>
<td>4.612±0.316</td>
<td>6.203±0.34*$@</td>
<td>6.761±0.15*#*$@</td>
<td>7.271±0.36*#*$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals. Group:

CL - control
FL - fluorescent light exposed group
LL - LED pre exposure + fluorescent light exposed group
OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
* denotes significant difference with CL
# denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals.

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant.

Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 46 – BRAIN Ca\(^{2+}\) ATPase

(μmoles phosphorous liberated /min/ ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>3.854±0.051</td>
<td>3.393±0.092*</td>
<td>3.830±0.037#</td>
<td>3.816±0.121</td>
</tr>
<tr>
<td>15 days</td>
<td>3.854±0.051</td>
<td>3.428±0.086*</td>
<td>3.921±0.036#</td>
<td>4.137±0.119*</td>
</tr>
<tr>
<td>30 days</td>
<td>3.854±0.051</td>
<td>11.152±1.071*$@$</td>
<td>12.791±0.471*$@*$</td>
<td>13.093±0.652*$@*$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

**TABLE: 48 – KIDNEY Ca$^{2+}$ ATPase**

(µmoles phosphorous liberated /min/ ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>3.892±0.035</td>
<td>3.872±0.026</td>
<td>3.845±0.029</td>
<td>3.913±0.035</td>
</tr>
<tr>
<td>15 days</td>
<td>3.892±0.035</td>
<td>4.258±0.143$^*$</td>
<td>5.934±0.250$^{#*}$</td>
<td>5.040±0.242$^*$</td>
</tr>
<tr>
<td>30 days</td>
<td>3.892±0.035</td>
<td>8.621±0.814$^{*$@}</td>
<td>8.621±0.816$^{*@}$</td>
<td>9.121±0.502$^{*@}$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 49 – LIVER Ca^{2+} ATPase (µmoles phosphorous liberated / min/ ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>4.284±0.030</td>
<td>2.697±0.306 *</td>
<td>3.925±0.081 *#</td>
<td>4.432±0.055</td>
</tr>
<tr>
<td>15 days</td>
<td>4.284±0.030</td>
<td>2.566±0.274 *</td>
<td>4.149±0.141 *$</td>
<td>4.128±0.009 $</td>
</tr>
<tr>
<td>30 days</td>
<td>4.284±0.030</td>
<td>7.625±0.221 *$@</td>
<td>10.272±0.913 *$@</td>
<td>9.631±0.332 *$@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- * denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**  
* denotes significant difference with CL  
# denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**  
$ denotes comparison with their respective 1 day group  
@ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>2.119±0.346</td>
<td>1.586±0.101*</td>
<td>2.158±0.144#</td>
<td>2.132±0.061</td>
</tr>
<tr>
<td>15 days</td>
<td>2.119±0.346</td>
<td>1.632±0.189</td>
<td>4.997±0.621###</td>
<td>2.505±0.115$</td>
</tr>
<tr>
<td>30 days</td>
<td>2.119±0.346</td>
<td>1.639±0.277</td>
<td>5.756±0.665###</td>
<td>6.662±0.122##@</td>
</tr>
</tbody>
</table>

**TABLE: 51 – BRAIN CYTOCHROME C OXIDASE**

(µmoles /min/ ml of homogenate)
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $^*$ denotes comparison with their respective 1 day group
- $^@$ denotes comparison between their respective 15 and 30 days group

**TABLE: 52 – HEART CYTOCHROME C OXIDASE**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.506±0.189</td>
<td>1.332±0.151</td>
<td>1.919±0.040</td>
<td>1.639±0.223</td>
</tr>
<tr>
<td>15 days</td>
<td>1.506±0.189</td>
<td>1.892±0.231$^*$</td>
<td>4.410±0.877$^*$#</td>
<td>2.465±0.185$^*$#</td>
</tr>
</tbody>
</table>
| 30 days | 1.506±0.189| 1.572±0.254| 4.930±0.531$^*$#| 6.995±0.312$^*$#@

GRAPH: 52 - HEART CYTOCHROME C OXIDASE
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 53 – KIDNEY CYTOCHROME C OXIDASE (µmoles /min/ ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.785±0.185</td>
<td>1.639±0.183</td>
<td>1.652±0.128</td>
<td>1.719±0.223</td>
</tr>
<tr>
<td>15 days</td>
<td>1.785±0.185</td>
<td>1.719±0.280</td>
<td>4.863±0.571**# $</td>
<td>1.692±0.506</td>
</tr>
<tr>
<td>30 days</td>
<td>1.785±0.185</td>
<td>1.572±0.122</td>
<td>4.157±0.550**# $</td>
<td>6.262±0.241*@</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant.

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $^\dagger$ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 55 – SKELETAL MUSCLE CYTOCHROME C OXIDASE

<table>
<thead>
<tr>
<th>Days</th>
<th>CL (µmoles/min/ml of homogenate)</th>
<th>FL</th>
<th>LL (µmoles/min/ml of homogenate)</th>
<th>OL (µmoles/min/ml of homogenate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.519±0.360</td>
<td>1.319±0.069</td>
<td>2.398±0.288*#</td>
<td>2.119±0.317</td>
</tr>
<tr>
<td>15 days</td>
<td>1.519±0.360</td>
<td>1.919±0.240$^\dagger$</td>
<td>4.584±0.046*#$^\dagger$</td>
<td>2.745±1.065</td>
</tr>
<tr>
<td>30 days</td>
<td>1.519±0.360</td>
<td>1.745±0.438</td>
<td>5.063±0.715*#$^\dagger$</td>
<td>5.423±0.046*#$^\dagger$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre-exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 56 – SPONTANEOUS MOTOR ACTIVITY (sec)

<table>
<thead>
<tr>
<th></th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>251±16</td>
<td>323±21*</td>
<td>319±4*</td>
<td>278±9</td>
</tr>
<tr>
<td>15 days</td>
<td>249±6</td>
<td>268±13*</td>
<td>272±8*</td>
<td>253±4$</td>
</tr>
<tr>
<td>30 days</td>
<td>241±11</td>
<td>334±20*$@</td>
<td>314±2*$@</td>
<td>252±11$</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 57 - MOTOR CO-ORDINATION (sec)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>78±5</td>
<td>56±2*</td>
<td>49±4*</td>
<td>74±4</td>
</tr>
<tr>
<td>15 days</td>
<td>127±15$</td>
<td>87±12*$</td>
<td>95±4*$</td>
<td>156±4*$</td>
</tr>
<tr>
<td>30 days</td>
<td>118±5$</td>
<td>49±4*@</td>
<td>112±11*#@</td>
<td>252±11*#@</td>
</tr>
</tbody>
</table>

Values given are Mean ± SD. Each group consisted of 6 animals
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre-exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with **CL**
- # denotes significant difference between **FL** and **LL**

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 58 – CEREBRAL CORTEX SEROTONIN (ng/gm of wet tissue)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>569.32±15.10</td>
<td>983.41±58.16*</td>
<td>946.32±96.68*</td>
<td>580.36±106.86</td>
</tr>
<tr>
<td>15 days</td>
<td>569.32±15.10</td>
<td>816.30±75.70*$</td>
<td>807.51±32.00*</td>
<td>527.54±26.32</td>
</tr>
<tr>
<td>30 days</td>
<td>569.32±15.10</td>
<td>564.92±44.31$@</td>
<td>576.43±43.16$@</td>
<td>543.99±39.09</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

**TABLE: 59 – VISUAL CORTEX SEROTONIN (ng/gm of wet tissue)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>588.67±41.41</td>
<td>1011.64±107.99</td>
<td>949.00±146.58*</td>
<td>591.53±68.16</td>
</tr>
<tr>
<td>15 days</td>
<td>588.67±41.41</td>
<td>738.56±43.51*$</td>
<td>772.65±70.10*</td>
<td>564.34±63.31</td>
</tr>
<tr>
<td>30 days</td>
<td>588.67±41.41</td>
<td>626.47±41.35$</td>
<td>637.68±47.38$</td>
<td>624.81±87.62</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
CL - control
FL - fluorescent light exposed group
LL - LED pre exposure + fluorescent light exposed group
OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
* denotes significant difference with CL
# denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL (ng/gm)</th>
<th>FL (ng/gm)</th>
<th>LL (ng/gm)</th>
<th>OL (ng/gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>61.34±2.45</td>
<td>139.87±9.06</td>
<td>136.03±3.451</td>
<td>61.75±2.75</td>
</tr>
<tr>
<td>15 days</td>
<td>61.34±2.45</td>
<td>70.93±7.99$</td>
<td>79.92±12.87$</td>
<td>58.24±4.57</td>
</tr>
<tr>
<td>30 days</td>
<td>61.34±2.45</td>
<td>63.03±3.08@</td>
<td>57.34±3.85$@</td>
<td>66.70±6.30</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL- control
- FL- fluorescent light exposed group
- LL- LED pre exposure + fluorescent light exposed group
- OL- only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05.

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
* denotes significant difference with CL
# denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
$ denotes comparison with their respective 1 day group
@ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>762.14±39.73</td>
<td>733.02±68.04</td>
<td>731.58±88.72</td>
<td>785.83±57.59</td>
</tr>
<tr>
<td>15 days</td>
<td>762.14±39.73</td>
<td>527.94±39.00*</td>
<td>507.51±35.25*</td>
<td>821.61±43.83</td>
</tr>
<tr>
<td>30 days</td>
<td>762.14±39.73</td>
<td>542.02±19.60*</td>
<td>610.13±16.25*</td>
<td>770.91±53.66</td>
</tr>
</tbody>
</table>

TABLE: 63 – VISUAL CORTEX NORADRENALINE (ng/gm of wet tissue)
**TABLE: 64 – CEREBRAL CORTEX DOPAMINE (ng/gm of wet tissue)**

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>91.14±2.84</td>
<td>66.13±7.20$^*$</td>
<td>61.52±6.78$^*$</td>
<td>86.52±8.47</td>
</tr>
<tr>
<td>15 days</td>
<td>91.14±2.84</td>
<td>57.68±6.30$^*$</td>
<td>75.43±2.02$^<em>$#$^</em>$</td>
<td>112.20±9.79$^*$@</td>
</tr>
<tr>
<td>30 days</td>
<td>91.14±2.84</td>
<td>55.81±6.26$^*$</td>
<td>122.65±5.99$^<em>$#$^</em>$@</td>
<td>143.37±6.78$^*$@</td>
</tr>
</tbody>
</table>

Values given are Mean ± SD. Each group consisted of 6 animals.

Groups:
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- $^*$ denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $^@$ denotes comparison with their respective 1 day group
- $^@$ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at *p*<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with **CL**
- # denotes significant difference between **FL** and **LL**

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>80.38±13.40</td>
<td>47.73±5.71*</td>
<td>47.82±3.68*</td>
<td>94.81±4.09</td>
</tr>
<tr>
<td>15 days</td>
<td>80.38±13.40</td>
<td>47.70±5.18*</td>
<td>50.112±4.30#</td>
<td>81.28±14.15</td>
</tr>
<tr>
<td>30 days</td>
<td>80.38±13.40</td>
<td>58.31±7.87</td>
<td>72.64±7.48$@</td>
<td>95.00±2.31</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals.

**Groups:**
- CL: control
- FL: fluorescent light exposed group
- LL: LED pre exposure + fluorescent light exposed group
- OL: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant. Level of significance was set at $p<0.05$

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $*$ denotes comparison with their respective 1 day group
- $@$ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at p<0.05

Comparison between groups denoted by superscripts:
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

Effect of Time denoted by superscripts:
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- **CL**: control
- **FL**: fluorescent light exposed group
- **LL**: LED pre exposure + fluorescent light exposed group
- **OL**: only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with **CL**
- # denotes significant difference between **FL** and **LL**

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE:  68 – KIDNEY ACETYLCHOLINE ESTERASE

(µmoles /min/ml of homogenate)

<table>
<thead>
<tr>
<th></th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 day</strong></td>
<td>1.858±0.143</td>
<td>1.818±0.175</td>
<td>2.009±0.210</td>
<td>2.251±0.358</td>
</tr>
</tbody>
</table>
| **15 days** | 1.858±0.143 | 3.348±0.465* | 5.700±1.051## | 8.211±0.793†#
| **30 days** | 1.858±0.143 | 2.416±0.107$@ | 4.439±0.369## | 5.353±0.417$@ |
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant
Level of significance was set at \( p<0.05 \)

**Comparison between groups denoted by superscripts:**
- * denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

### TABLE: 69 – LIVER ACETYLCHOLINE ESTERASE (µmoles/min/ml of homogenate)

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>1.786±0.052</td>
<td>1.698±0.545</td>
<td>2.057±0.121</td>
<td>1.778±0.344</td>
</tr>
<tr>
<td>15 days</td>
<td>1.786±0.052</td>
<td>3.014±0.344*</td>
<td>6.561±0.617**</td>
<td>4.999±0.511*</td>
</tr>
<tr>
<td>30 days</td>
<td>1.786±0.052</td>
<td>1.786±0.257@*</td>
<td>5.008±0.494**@*</td>
<td>4.467±0.441*</td>
</tr>
</tbody>
</table>
Values given are Mean ± SD. Each group consisted of 6 animals

Groups:
- CL - control
- FL - fluorescent light exposed group
- LL - LED pre exposure + fluorescent light exposed group
- OL - only LED exposed group

ANOVA was performed followed by Tukey’s multiple comparison if F test ratio was significant

Level of significance was set at p<0.05

**Comparison between groups denoted by superscripts:**
- *denotes significant difference with CL
- # denotes significant difference between FL and LL

**Effect of Time denoted by superscripts:**
- $ denotes comparison with their respective 1 day group
- @ denotes comparison between their respective 15 and 30 days group

<table>
<thead>
<tr>
<th>Days</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 day</td>
<td>2.105±0.228</td>
<td>1.802±0.378</td>
<td>2.025±0.109</td>
<td>2.152±0.159</td>
</tr>
<tr>
<td>15 days</td>
<td>2.105±0.228</td>
<td>6.561±0.625*</td>
<td>6.059±0.451*</td>
<td>6.960±0.625*</td>
</tr>
<tr>
<td>30 days</td>
<td>2.105±0.228</td>
<td>2.822±0.201*$@</td>
<td>4.333±0.315*$@</td>
<td>4.474±0.262*$@</td>
</tr>
</tbody>
</table>
Data measured at 9 different points for each section of retina for an animal. Average of it was taken as value for that animal.
Values given are Mean ± SD for the group. Each group consisted of 6 animals.

Groups
CL- control, FL- fluorescent light exposed group, LL- LED pre exposure + fluorescent light exposed and OL - only LED exposed group. Kruskal-Wallis test was used to compare the groups

Comparison between groups:
*denotes significant difference with CL
*#denotes significant difference between FL and LL
TABLE: 72 – RETINAL HISTOLOGY - 30 DAYS GROUP

<table>
<thead>
<tr>
<th>Retinal histology</th>
<th>CL</th>
<th>FL</th>
<th>LL</th>
<th>OL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total thickness(µm)</td>
<td>118.05±7.18</td>
<td>85.7±6.80*</td>
<td>107.88±9.88#</td>
<td>127.75±1.71</td>
</tr>
<tr>
<td>Outer nuclear thickness (µm)</td>
<td>36.43±3.34</td>
<td>19.48±1.57*</td>
<td>25.7±6.82*</td>
<td>36.45±4.63</td>
</tr>
<tr>
<td>Cell count (numbers)</td>
<td>374.67±15.89</td>
<td>137±9.54*</td>
<td>194.67±17.90*#</td>
<td>529.67±12.42*</td>
</tr>
</tbody>
</table>

Data measured at 9 different points for each section of retina for an animal. Average of it was taken as value for that animal.

Values given are Mean ± SD for the group. Each group consisted of 6 animals.

Groups
CL- control, FL- fluorescent light exposed group, LL- LED pre exposure + fluorescent light exposed and OL - only LED exposed group. Kruskal-Wallis test was used to compare the groups

Comparison between groups:
*denotes significant difference with CL
#denotes significant difference between FL and LL
Figure 9: Retinal sections - Total and ONL Thickness – 15 days:

CL

FL<sub>15</sub>

LL<sub>15</sub>

OL<sub>15</sub>

Total retinal thickness  Outer nuclear layer thickness.

Light microscopic images of retina layers (40x), 15 days period - control (CL), fluorescent light (FL<sub>30</sub>), LED pre exposure + fluorescent light (LL<sub>30</sub>) and only LED exposure (OL<sub>30</sub>). Nerve fiber layer– NFL, Ganglion cell layer - GCL, Inner plexiform layer - IPL, Inner nuclear layer - INL, Outer plexiform layer – OPL, Outer nuclear layer – ONL, External limiting membrane – ELM, layer of rods & cones - LRC, Retinal pigmented epithelium - RPE, Choroid and Sclera. (Pictures given are retinal section from 1 rat in each group)
Figure: 10 - Multi thresholding images of ONL cell count of retina (15 days)

CL - Control, FL$_{15}$ - fluorescent light, LL$_{15}$ - LED pre exposure + fluorescent light and OL$_{15}$ - only LED exposure (OL). (Picture given is retinal ONL cell count section from 1 rat in each group)
Figure 11: Retinal sections - Total and ONL Thickness – 30 days:

CL

FL_{30}

LL_{30}

OL_{30}

Total retinal thickness \quad \text{Outer nuclear layer thickness.}

Light microscopic images of retina layers (40x), 30 days period - control (CL), fluorescent light (FL_{30}), LED pre exposure + fluorescent light (LL_{30}) and only LED exposure (OL_{30}). Nerve fiber layer–NFL, Ganglion cell layer - GCL, Inner plexiform layer - IPL, Inner nuclear layer - INL, Outer plexiform layer – OPL, Outer nuclear layer – ONL, External limiting membrane – ELM, layer of rods & cones- LRC, Retinal pigmented epithelium - RPE, Choroid and Sclera. (Pictures given are retinal section from 1 rat in each group)
Figure: 12 - Multi thresholding images of ONL cell count of retina (30 days)

CL

FL_{30}

LL_{30}

OL_{30}

CL - Control, FL_{30} - fluorescent light, LL_{30} - LED pre exposure + fluorescent light and OL_{30} - only LED exposure (OL). (Picture given is retinal ONL cell count section from 1 rat in each group)