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Received on 06-08-2016

Accepted on 10-09-2016

Abstract

Library is one of the important places where people who are interested in studying often spend long hours of the day and the importance of this issue is much more visible in student activities. Good lighting and its optimal distribution in such an environment can greatly reduce the incidence of various disorders. The aim of this study was to assess local and general lightening and UV radiation in the libraries of Kermanshah University of Medical Sciences in 2016. This study was a cross-sectional study, which was carried out in the spring of 2016 in libraries, study halls, and computer sites of Kermanshah University of Medical Sciences' faculties. Hagner device (screen master) made in Sweden in height of 30 inches (76 cm) from the floor and in the center of the measuring stations was used to measure the light intensity. The light intensity for each station was recorded in Lux. To measure ultraviolet radiation using the EC1-Hagner made in Sweden, and according to local standards brightness measured, it was tried to measure ultraviolet radiation in the library and any college sites monitors. From 15 reading rooms in this study, 8 rooms (53.3%) in terms of general light intensity were in favorable conditions, three halls (20%) in terms of distribution of natural lighting intensity were in good conditions. And of five bookshelves in the faculties under study, 3 halls (60%) in terms of the intensity distribution of local lighting were in good conditions. The values measured of UV radiation were less than standard mode. According to the results, it can be said that, poor lighting in the mentioned libraries is primarily due to the change in user. In addition, measurements indicate that, at some stations, the intensity is recommended higher than standard, but their average shows improper situation of lightening, so that improper alignment of the lamps causes this unfavorable situation. Library has been studied as case study and lack of proper design, improper selection of lighting sources, as well as the lack of timely maintenance lead to reduce lightening.
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Background and objective: The study aimed to assess the severity of local and general lighting in the libraries of Kermanshah University of Medical Sciences in 2016.

Methodology: The participants included 60 students from different libraries of the university. The atmosphere of the libraries was assessed using a standard measuring device. The light intensity was measured using a Lux meter. The UV radiation dosage was measured using a UV radiometer.

Results: The results showed that the light intensity in the libraries was lower than the recommended levels. The UV radiation dosage was also higher than the recommended levels.

Discussion: The findings highlight the need for improvements in the lighting conditions in the libraries. The high UV radiation dosage may pose a risk to the health of the students.

Conclusion: The study recommends improvements in the lighting conditions in the libraries to ensure optimal conditions for study.

Key words: Lighting, UV Radiation, Library, Assessment.
Materials and methods

This study was a cross-sectional study which was carried out in the spring of 2016 in the libraries, reading rooms, computer sites in the faculties of Kermanshah University of Medical Sciences, and in general, the number 5 libraries, 5 computer laboratories, 5 study halls, were measured. Measurements were done in three modes: general lighting (artificial + natural lighting), natural lighting, and local lighting. To determine the station, the target level was divided into 3m * 3m squares. In this manner, it was specified that (5). Hagner device (screen master) made in Sweden in height of 30 inches (76 cm) from the floor in the center of the measuring stations was used to measure the light intensity. The light intensity for each station was recorded in Lux. Daylight is affected by the time of measurement and the situation of the sky in terms of cloud cover (cloudy, partly cloudy, and clear). During the day, the intensity of lightening changes. For this reason, measurement on clear days was conducted in the morning at 10 to 11 AM and afternoon at 15 to 16 PM, and the measured values were averaged. During measuring natural light, all the lamps (artificial lightening sources) were turned off. After measuring, with turning on the lamps again, the general lightening (natural and synthetic) were measured. And also according to the standard instructions and a pattern arrangement about arrangement of lamps, the local lightening inside books shelves were measured (6.5). For the measurement of UV radiation, using the EC1-Hagner made in Sweden based on calibration certificate, device sensor was calibrated, and based on standards related to measuring local lightening, ultraviolet radiation was measured in the library and monitors in sites of each faculty on clear days and at 10 pm to 11 am and from 15 to 16 PM in both natural lighting and general lighting modes (6).

Results: According to Table, of 15 reading rooms under study, 8 study halls equivalent to 53.3% were in favorable conditions in terms of general lightening intensity, 3 study halls, nearly 20 percent were in favorable conditions in terms of the distribution of light intensity (lighting more than 300 lux) which Paramedical computer hall, in terms of total and natural light had the highest rank, and reading room of Paramedical faculty and computer hall of the Medical and Dental School had the lowest rank in terms of total lightening and natural light is included.

Table-1: Measuring the intensity of light and natural values of the Libraries, schools of Kermanshah University of Medical Sciences

<table>
<thead>
<tr>
<th>Name of The Center</th>
<th>Average Entire Lighting (Lux)</th>
<th>Min</th>
<th>Max</th>
<th>Average Natural Lighting (Lux)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book Reservoir Medicine</td>
<td>195.75</td>
<td>138</td>
<td>258</td>
<td>76.4</td>
<td>63</td>
<td>122</td>
</tr>
</tbody>
</table>
As shown in Table 2, from 5 reading rooms, 3 halls (bookshelves), accounting for 60% were in favorable conditions in terms of local lightning intensity distribution that in terms of local lightening, bookshelves in Medical school had the highest value. In addition, the bookshelves in Medical School had the lowest value in terms of local lightening.

**Table 2: The measured values luminous intensity topical Libraries schools of Kermanshah University of Medical Sciences.**

<table>
<thead>
<tr>
<th>Name of the center</th>
<th>Average entire lighting (Lux)</th>
<th>Min</th>
<th>Max</th>
<th>Average natural lighting (Lux)</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bookshelves In Hygiene School</td>
<td>334.3</td>
<td>107</td>
<td>1023</td>
<td>231.7</td>
<td>30</td>
<td>540</td>
</tr>
<tr>
<td>Bookshelves In Dentistry School</td>
<td>345.9</td>
<td>112</td>
<td>981</td>
<td>130</td>
<td>45</td>
<td>123</td>
</tr>
<tr>
<td>Bookshelves In Medical School</td>
<td>161.75</td>
<td>43</td>
<td>295</td>
<td>88.7</td>
<td>28</td>
<td>260</td>
</tr>
<tr>
<td>Bookshelves In Pharmacy School</td>
<td>232</td>
<td>36</td>
<td>469</td>
<td>198</td>
<td>32</td>
<td>388</td>
</tr>
<tr>
<td>Bookshelves In Paramedical School</td>
<td>370</td>
<td>47</td>
<td>1190</td>
<td>236</td>
<td>36</td>
<td>590</td>
</tr>
</tbody>
</table>

School of Health had a higher amount of UVA radiation in both total and natural lightning measurements. In total, given that, the amount of ultraviolet radiation in the library is much less, than the standard amount, but the library lamps must be selected carefully (Table 3).
Table-3: The measured UV Libraries schools of Kermanshah University of Medical Sciences.

<table>
<thead>
<tr>
<th>Name of the center</th>
<th>Average UV halls libraries (W/m2)</th>
<th>Average UV monitors of libraries (W/m2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average total UV</td>
<td>Average natural UV</td>
</tr>
<tr>
<td>LibraryHygiene School</td>
<td>0.25</td>
<td>0.24</td>
</tr>
<tr>
<td>LibraryDentistry School</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>LibraryMedical School</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Library Paramedical School</td>
<td>0.13</td>
<td>0.06</td>
</tr>
<tr>
<td>Library Pharmacy School</td>
<td>0.09</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Discussion

According to the results and comparison of the intensity of general lightening of the libraries with standard values, the minimum proposed by the IESNA was determined that in general, 47.7% of the units and in the natural state, 80 percent of the units as well as 40 percent of local lightening of bookshelves in this study was lower than the standard minimum. As well as measurements show that the UV measured value is less than standard and in good condition.

Majidi et al, in a study, examined the intensity of lightening in the libraries with irregular geometric shapes in the city of Zanjan. The results are indicative of the fact that the overall, natural and artificial lightening were less than 300 LUX, 51 percent, 80 percent and 99 percent, respectively. It is therefore essential that by correcting its deficiencies again, at least be met in these libraries (5). A study which was conducted in the United States to measure lighting in homes, showed that its value is less than standard (8). Another study was carried out at a university in Costa Rica by Espinoza et al in 2010 and reported that 50 percent of measurement stations in relation with workshop shade inadequate lighting. Disproportion between studied sites with its users, the lack of attention to proper lighting system design has led in some cases, the lightening is less than the standard, and it was determined that all 61 measuring points in the Library has had bad lighting (9). In another study which was done by Abramason et al at the University in Brazil on every seat available in classrooms, it was found that, in most of the seats, the lighting is appropriate and above the standard level (10). A study carried out by GhotbiRavandiet al to evaluate the lightening and UV radiation in the public libraries of Kerman universities in 2010 showed that the difference between the ultraviolet intensity measured in both the general and natural, in some cases, was significant, and in others, although the difference was not significant, but significant differences indicate that the values of the radiation emitted from the lamps is high. However, the values measured for the radiation in the desired places are less than the effective ultraviolet radiation received according to Iranian standard (6). Finally, according to the results obtained, we can say that, poor lighting in the libraries is mainly due to the change...
According to the measurements, the lightening intensity is higher than standard at some stations, but their average shows unfavorable condition of lightening which was due to improper alignment of the lamps. However, quantitative parameters such as average lighting intensity, is a necessary condition for judging the adequacy about lightening systems does not indicate the adequacy of a system to provide comfort and safety and sufficient condition is establishing desirable characteristics in terms of quantity and quality for lighting systems in places (such as high brightness, creating desired color, observing the general principles of design, etc.). The library was studied as a case study, and lack of proper design, improper selection of lighting sources and the lack of timely maintenance reduce the lightening intensity. On the other hand, there is need to redesign the lightening system, because some of buildings are old, there are changes in user. In addition, the maximum use of natural lighting can greatly be used to provide appropriate lightening and reduce energy consumption.

**Conclusion**

According to the results, it can be said that, poor lighting in the mentioned libraries is primarily due to the change in user. In addition, measurements indicate that, at some stations, the intensity is recommended higher than standard, but their average shows improper situation of lightening, so that improper alignment of the lamps causes this unfavorable situation. Library has been studied as case study and lack of proper design, improper selection of lighting sources, as well as the lack of timely maintenance lead to reduce lightening intensity and given the high importance of this issue, follow-up and regular proceedings of the relevant authorities could ultimately lead to create a desirable space in these places.

**References**


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