Data Article

Ultraviolet radiation rate in Mashhad, Iran

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Abstract

Todays, Climate change can be effect on the intensity of ultraviolet (UV) radiation and cause of many human diseases. In this cross-sectional study, changes of the intensity of UV ray were associated with the changes in latitude and longitude, height, climatic conditions, natural and human-made artifacts. Given that the highest radiation intensity was at the beginning of the summer, the radiation rate of UV ray in Mashhad was measured in the summer using a Hagner radiometer, the UV-A model. The radiation rate of the UV ray was determined in 2000 stations, which were 5 km far from each other. Data were analyzed using SPSSv16 software, T-test, and ANOVA tests. The results of this study showed that the radiation rate of UV ray in Mashhad was 0.49 ± 0.143 mSv per year. The findings showed that latitudinal and longitudinal changes did not have a significant effect on the intensity of UV radiation (P > 0.001). The changes in the height above the sea level increased UV radiation (P < 0.001). Human artifacts significantly changed the rate of UV radiation (P < 0.001). Cloudy, semi-cloudy and sunny conditions had the most effects on UV radiation. The results revealed that the average rate of UV ray in Mashhad was below the global standard (10 W/m² for UV ray), and traffic in open air could not be risky.

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Value of the data

- UV is the most important cosmic rays. UV radiation with medium and short wavelengths endangers human and living organisms in the open air. Therefore, continuous and periodic monitoring of this radiation is necessary. The data of this study is aimed at achieving the mentioned goal.
- Due to no study has been done on this topic in the region so far. The data of this study can help to better understand the rate of hazardous Ultraviolet ray in the area and provide further studies.
- According to the data of this study, the average of UV ray in the Mashhad city was safe and below the global standard (10 W/m² for UV ray).

1. Data

1.1. Relationship between longitudinal changes and the intensity of UV radiation in Mashhad

Fig. 1 shows the relationship between changes in longitude and UV in Mashhad. These figures show that longitudinal changes have no effect on the intensity of UV radiation (P-value > 0.001).

1.2. Relationship between latitudinal changes and the intensity of UV radiation in Mashhad

Fig. 2 shows that there is a meaningful relationship between latitudinal changes and UV radiation. In other words, as the latitude increases, the intensity of UV radiation decreases (P-value < 0.001).

1.3. Relationship between the height above free sea level and the intensity of UV radiation in Mashhad

Fig. 3 shows the relationship between the height above sea level and the intensity of UV radiation in Mashhad. As it is shown in Fig. 3 by increasing heights above free sea level, the intensity of UV irradiation significantly increases (P-value < 0.001).

1.4. The effect of human-made artifacts on the intensity of UV radiation

Table 1 shows the effect of human on the intensity of UV radiation in Mashhad. Table 1 shows that in the village, the average UV was higher than other human-made artifacts, and the lowest level of UV radiation was related to urban artifacts. Table 1 shows that there is a significant relationship between human-made artifacts and UV radiation (P-value < 0.001).
1.5. The effect of weather conditions on the intensity of UV radiation in Mashhad

Table 2 shows the effect of climatic conditions on the intensity of UV radiation in Mashhad. Table 2 shows that there is a significant correlation between weather conditions and UV (P-value < 0.001) and the cloudy, semi-cloudy and sunny conditions have the most effect on the intensity of UV radiation, respectively. Also in Tables 3 and 4 meteorological parameters and amount of particulate matter (PM 2.5) in Mashhad (2016–2017) are reported.
Table 1
Effect of manmade effects on ultraviolet radiation intensity in Mashhad.

| Radiation type | Average of UV (W m⁻²) |
|----------------|-----------------------|
| Location       | City                  | Village               | Avenue                | Other                |
| Mannmade effects| 0.39                  | 0.63                  | 0.56                  | 0.41                 |

Table 2
Effect of climatic conditions on the intensity of ultraviolet radiation in Mashhad.

| Radiation type | Average of UV (W m⁻²) |
|----------------|-----------------------|
| Conditions     | Cloudy                | partly cloudy         | Sunny                 |
| Climatic effects| 0.45                  | 0.66                  | 0.46                  |

Table 3
Meteorological parameters, including the number of rainy days and sunny days in Mashhad.

| Parameter                  | Data  |
|----------------------------|-------|
| Sunny hours                | 2857  |
| Rainy days                 | 21    |
| Relative humidity (%)      | 53    |
| Minimum temperature (°C)   | -21   |
| Minimum temperature (°C)   | 43.8  |
| Average annual temperature (°C) | 14.5  |
| Annual average precipitation (mm/year) | 233.8 |
| Average annual evaporation (mm/year) | 1824  |
| The highest wind speed (m/s) | 25    |
Table 4
The amount of particulate matter (PM 2.5) in Mashhad.

| Month     | Concentration (µg/L) |
|-----------|----------------------|
| January   | 32.3                 |
| February  | 41.5                 |
| March     | 36.2                 |
| April     | 27.6                 |
| May       | 19.4                 |
| June      | 14.2                 |
| July      | 33.5                 |
| August    | 40.8                 |
| September | 60.3                 |
| October   | 31.5                 |
| November  | 48.9                 |
| December  | 33.7                 |

2. Experimental design, materials and methods

2.1. Geographical location of studied area

Mashhad city with population over three billion person and an area of about 351 km² is located in 59°,36 E longitude and 36°,18 N latitude (Fig. 4). The neighboring cities are Torbat-e Heydarieh and Ghoochan in the south and north, Sabzevar and Sarakhs in the west. The average height of the city from the open sea level is 1050 m. Its center of Khorasan Razavi province and according to the last divisions of the country.
2.2. Method and material

This cross-sectional study was carried out in July of 2017 to determine how the variations of UV radiation were associated with changes in latitude, longitude and, height above the sea level and artificial or human-made and natural artifacts in Mashhad, Khorasan Razavi province in Iran. To this end, the data were collected 2000 sampling stations in different parts of the city (urban, rural, road, etc.). The sampling points were approximately 5000 m far from each other [1]. UV radiation was measured using Hagner radiometer, model UV-A in watt/m² in milliseconds [2]. In this study, all conditions for the selection of sampling points were in accordance with the conditions set out in the valid references [1–5]. Data were analyzed by SPSS16 software using t-test and ANOVA.

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.05.116.

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