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The assessment of pollution effects on the weather of Urmia in second half of the year 2012

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Abstract: The human of thousandth anniversary is challenging with his imposed conditions that is caused by his own interference in the environment. Air pollution certainly is one of the most uncontrolled activities during the last 3 centuries. According to importance of increasing the air pollution in this study, the condition of PM contaminant in a period of six months (October to March) is presented. The researchers proceeded to daily calculation of air quality using by AQI indicator. Results indicate: 119 days (72 %) are in the quality indicator 51 – 100 in middle group, 19 days (11.5%) are in a good condition and 2 days are in danger. The most strong viscosity is indicated on October 14 about 420 μg/m^3 and the time was from 22 Pm on October 14 to 2 Am on October 15. The time peak was 714 μg/m^3.

Key words: Air pollution; PM contaminant; AQI indicator

1. Introduction

Air pollution is one of the greatest disturbances of world communities it is seen in most places but the effects in low developed countries are more obvious. This worldwide challenge as one of the causes of development of urbanism, increasing of industrial activities and using the fossil fuels besides the environment demolition and economy damages is one of the 10 more important causes of increasing the mortality in the world.

So that the rate of mortality caused by is reached from 800000 persons in 2000 to 1.3 million in 2010 and 65% occurred in Asia. Today this problem threats one billion populations worldwide.

According to the results of worldwide bank, the annual cost of direct and indirect damages caused by air pollution in development countries reaches to 5% of nation gross produce.

Researchers of atmosphere and environment proceeded most studies about air pollution worldwide. Here are some of them. Shamsipoor and his colleagues presented researches of similar dispersion of air pollution in Tehran. These researches using air pollution scale model

contains (TAPM) about dispersion of contaminants pattern in the earth surface, found that the results of similar dispersion shows that air blowing conditions, increasing of kinetic energy caused by wind speed and atmospheric transient conditions and horizontal transfer of contaminants and also creating vertical movement causes air pollution adjustment.

Scani Kazzazi and Siahpirani (1389) proceeded to search about air pollution of Tehran. Researchers assessed the changeable of carbon monoxide, nitrogen dioxide and sulfur dioxide at stations of contaminants measurement of Azadi, Foriye, Tajrish, Markazi and Gholhak from December 17 to 23, 1377 using by skew-T graph and analyzing pressure system. The result showed that in the statistical period if the high tension settlement of an area is the kind of middle systems in the area, the density of contaminants will be increased and changed it sometimes to twice or three times as much. Khorsandi and others (1391) studied the quality weather condition in Urmia and introduction the contaminants in 1390. These researchers studied instantaneous density of the contaminants carbon monoxide, sulfur dioxide, nitrogen dioxide and hanging corpuscles using by Ecotec, Envir SA analyzers, at 4 stations in Urmia. Results proved 25 days out of the defined conditions.

Leyli and colleagues 1388 showed the presentation of hanging corpuscles density and air quality indicator (AQI) at 2 stations reported between 2 months, February 1385 to Khordad 1386, located in central area of Tehran. Air quality indicator (AIQ) for station number one (Enghelab square) about 32% and for station number 2 (Gisha) about 10.5% have been reported to be unclean. The PM 2.5 contaminant was responsible, 87% for Enghelab square and 82% for Gisha bridge.

Akbar Bidokhti and Banihashemi (1376) studied the affection of boundary layer and air pollution. Results showed this boundary layer changes day and night and according to its changes, density of contaminants changes too.

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Ardakani and Cheraghi (1387) in their study named the process of hygienic quality of weather in Tehran in 1385 using the air quality indicator proved 261 day out of the conditions in Tehran in 1385. Carbon monoxide was known responsible for 84% of these contaminants.

Mousavi and Nadafi (1379) proceeded to studying about air quality in Tehran in 1376-77. They found that in 1376, air quality was about 32% unhealthy and in 5% it was too unhealthy. Whereas, these cases were increased to 34 and 6 percent in 1377.

Safari and Alijani (1385) proved relation between pressure patterns and air pollution for Tehran. They should that there is a high relationship between pressure and high level of pollution.

In 1385 Cheraghi and his colleagues also studied about comparing of air conditions in Tehran and Isfahan in 1378 and presented the ways in that the solutions were found. They proved that in Tehran the months Khordad, Shahrivar, November, and February and in Isfahan, the month Khordad was too contaminated. This also was found that in Tehran in 1378, 90 percent of days were more than the standard limit.

Class and colleagues with almost 200 million people, according to reports of world hygiene organization in 2000 stayed in the areas that, the level of contaminants was upper than the standards of air quality.

Lakshmi sing and Jamal (2012) studied about the affection of air pollution on 2101 women who spend most of times at home. The result showed that contaminants caused by cook were compared according to the incomes. Poor families, because of using the fossil fuels

Specially, petroleum is in danger more than others, and involved in diseases such as tuberculosis, cataract, and respiratory infections.

Parshant (2000) proved that PM_{10} and $PM_{2.5}$ molecules often accure in crowded times in Delhi.

Lan and Chang (1998) examined synoptic and its application in order to define the climate affection on sulfur dioxide and nitrogen dioxide density in Hong-Kong.

Olga and colleagues (2009) in a studying examined the amalyses of air pollution around the central stations of London.

Silo and Andrew (2002) presented a studying in Brazil that showed the relation of meteorology and contaminate density of hanging molecules that shows the high levels of their density and high pressure systems beside southern Atlas. Canic (2005) also studied about the rate of hanging molecules $PM_{2.5}$ that was more than standard amounts of department of environment America. Roudrigz (2001) obtained the middle rate of PM_{10} , 18 μg/m^3 and 50 μg/m^3 according to his studying in south and east of Spain.

2. Studying method

In order to reach to the purposes in this study statistics and data about the contaminant of hanging molecules PM_{10} from environment agency Urmia for this city were reported.

The purpose of this study was to studying about air quality of the second half of year 1389 in Urmia. Air quality indicator (AQI), is one of the indicators, involving in introduction of air healthy or unhealthy. Researchers used the formula 1 to reach this fact. According to data gained from environment agency. Changed to daily average and the indicator AQI was calculated for each cold month for contaminant PM_{10}.

$$I_P = \frac{I_{Hi} - I_{Lo}}{BP_{HI} - BP_{Lo}}(C_P - BP_{Lo}) + I_{Lo}$$

In this formula, I_p, introduces the air quality indicator for contaminant P. C_P, is the measurement of P, BP_{Hi} shows contraction point $\leq C_P$, I_{Hi} shows the amount of AQI conforming with BP_{Hi} , I_{Lo} shows the amount of AQI conforming with BP_{Lo}.

Table 1: Air quality indicator (AQI) based on PM_{10}

Classification	AQI		Fracture spots for particles of PM_{10}	
Good	50	0	54	0
average	100	51	154	55
Unhealthy for sensitive people	150	101	254	155
Unhealthy	200	151	354	255
Dangerous	250	201	424	355
Critical	300	301	604	425

Using the formula and chart 1, the indicator AQI was calculated for contaminant PM10, and then the air quality in different months was evaluated.

3. Discussion and result

According to accounts among 29 days in October, 22 days were in a middle quality. 4 days were unhealthy for delicate people, 2 days in dangerous condition and the rest one day in critical situation. In November, 3 percent of the days contained a good weather, 19 days, in average quality and the rest were reported as unhealthy for sensitive people.

The air quality indicator was calculated in 26 days of month December, but they had not a good quality. 22 days were in average quality and the rest 8 days; just 6 days were in good quality.

In February also among 25 days, 7 days had good quality and 17 days were average and just one day was dangerous for sensitive people. See the Table 2.

In total for 165 days in the second half in a year , 19 days were good quality , 119 days in average , 26 days were unhealthy and 1 day in critical situation. In these 6 months the month October was in a poor quality and one day in critical condition and the indicator AQI was 309. Fig. 1 shows the rate of contaminant PM10 in 6 months.

Fig. 2 shows hourly changes of hanging molecules contaminant PM10 on October 14 and 15.

Table 2: Indicator AQI about the 2 certain studies

AQI classification	March		February		January		December		November		October	
	%	day	%	day	%	day	%	day	%	day	%	day
Good	16.6	5	23.3	7	20	6	-	-	3	1	-	-
Average	70	21	56.6	17	60	18	73.3	22	63	19	75.8	22
Unhealthy for sensitive people	3.3	1	3.3	1	6.6	2	27.7	8	34	10	13.8	4
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Dangerous	-	-	-	-	-	-	-	-	-	-	6.8	2
Critical	-	-	-	-	-	-	-	-	-	-	3.2	1

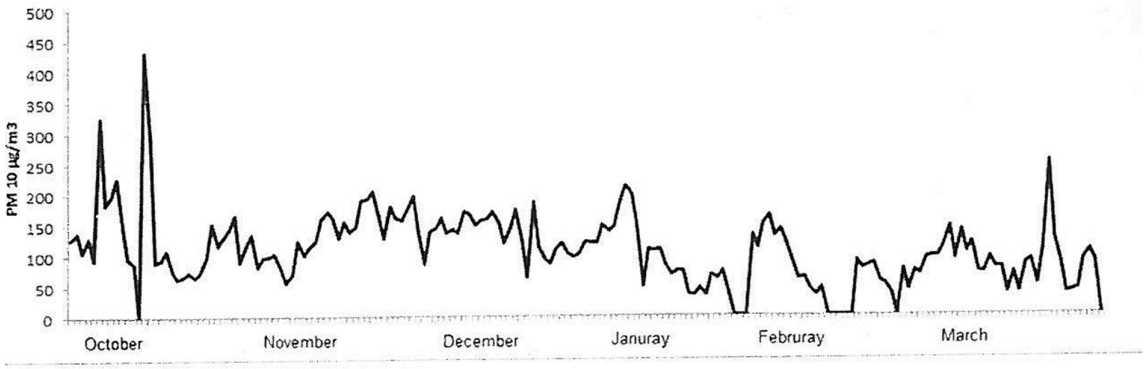

Fig. 1: Daily amount of contaminant PM_{10} in different months

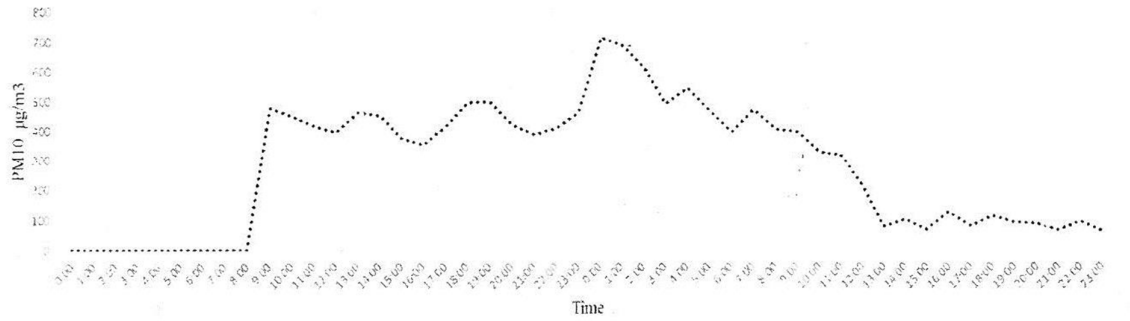

Fig. 2: Hourly graph of PM10 contaminant changes on October 14 and 15, the contamination peak days

4. Results

Air pollution is because misusing of sources that increased the rate of mortality annually. Mega cities and crowded countries are in danger too. The air quality of Urmia in the second half of year for contaminant PM10 proved that 19 days are in good quality , 119 days in poor quality, 26 unhealthy for sensitive people , 2 days in danger and one day in critical group.

In this study, the month October was too unhealthy with a view to air quality indicator. The severest density of this contaminant on October 14 was about 420 µg/m3. The peak time was from 22 PM to 2 AM the peak time for this contaminant was 714 µg/m3.

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