



Comparative Study of air particulate matter concentrations in different traffic stressed sites of Quetta City, with special reference to their harmful impact on human health

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ABSTRACT: Quetta is the most polluted city among the other big cities of Pakistan as it contains dangerous atmospheric air pollutant particles, therefore, Quetta city is ranked at number four along with Ludhiana tied at 251mcg/m³. The present study brings together methodological and substantive contributions in the estimation of air pollution in Quetta city of Balochistan province of Pakistan and their harmful effects on human health. These air pollutants include lead, carbon monoxide (CO), carbon dioxide (CO₂), ammonia (NH₃), nitrogen dioxide (NO₂), particulate matter (PM) and sulphur dioxide (SO₂) release in the atmospheric environment of Quetta city from the different resources i.e., motor vehicles/automobiles, coal burning, bomb blasting, kiln backing in furnaces and natural gas burning. The methodology was based on Quetta's ambient air pollution in which the concentration of NO₂, pollutant TSP, PM₁₀ and PM_{2.5} at three most traffic stressed sampling sites (Meezan Chowk, Alamdar Chowk and Sirki road) of Quetta city were calculated. The average concentration of NO₂ at three selected sites i.e., Meezan Chowk, Alamdar Chowk and Sirki road in Quetta was 69.50, 47.28 and 30.41 (µg/ m³) respectively. In Meezan Chowk sample the TSP was found as 1000 (µg/ m³), PM₁₀ as 300 (µg/ m³) and PM_{2.5} as 150 (µg/ m³), whereas in Alamdar Chowk sample, TSP concentration was above 1600 (µg/ m³), PM₁₀ 700 (µg/ m³) and PM_{2.5} 140 (µg/ m³). In Sirki road samples, TSP, PM₁₀, PM_{2.5} concentration was found as 1100 (µg/ m³), 300 (µg/ m³) and 100 (µg/ m³), respectively. The results of the present study revealed that blood pressure, ENT (eye, nose and throat), fatigue, and diseases like asthma, cardiovascular and cancer were highly correlated with lead distribution, thence, it was finally concluded that focusing on the decrease in the pressure of pollutant resources and opting preventive measures are mandatory for reducing the harmful impact of these pollutants on human health.

Keywords: Quetta city, air particulate matter concentrations, impact on human health.

INTRODUCTION

Quetta, the capital and largest city of Baluchistan Province, Quetta, 1692 meters above sea level is a cup shaped valley covered from all dry mountains has population of about 1.4 million. Increasing automobiles traffic in the city and use of agriculture land for constructing buildings has spoiled the environment of the city. The major sources of air pollutants entering the municipal district of Quetta area are old poorly maintained diesel engine local buses running between city and suburbs, two stroke petrol engine rickshaws fueled by lubricating oil, the oily exhaust smoke and benzene constitute the main hazards. Since there is no

control of exhaust gases, they emit black smoke of incomplete combustion fuel all over the city. In addition to motor vehicles, industrial enterprises situated within the city, thermal power station, stone crusher plants, and brick kilns contribute substantially to the atmospheric pollution of Quetta. Quetta also situated in arid zone therefore, dry weather is also a reason of air dust. Roadside burning of rubbish occurs to some extent, producing smoke obnoxious. Poisonous phosgene (carbonyl chloride) and hydrogen chloride gases from the burning of PVC plastic are added to the existing pollution in Quetta Valley with accumulation of primary pollutants come from the highly rate of

traffic stressed which increased day by day; and some suspended fine particles such as water droplets dust and soot, the dangers they pose range from eye and throat irritation to global warming and under the influence of sunlight contribute to the smog (Sami *et al.*, 2006).

MATERIALS AND METHODS

The present study is based on comparative Study of Air Particulate Matter Concentration at Traffic Stressed Sites of Quetta City, Pakistan. In study area, the increasing quantity of the air particulate matter (PM) caused by motors/vehicles/automobiles, coal burring, bomb blasting, kiln backing in furnaces and natural gas burring. The particulate matters examined in current study was collect by sampling method through high volume air sampling systems (HI-Q-Model PM-10 Series) and lecture review. In sampling method, most traffic areas i.e., Meezan Chowk, Alamdar Chowk and Sirki Road in Quetta were selected for the present study. These different sites give the different results.

RESULTS AND DISCUSSION

In the present study, Quetta has no surface water sink source to help out Quetta from the air pollution. The methodology was based on Quetta's ambient air pollution in which the concentration of NO_2 , pollutant TSP, PM_{10} and $\text{PM}_{2.5}$ at three most traffic stressed sampling sites i.e., Meezan Chowk, Alamdar Chowk

and Sirki road of Quetta city were calculated. In the present investigation, we have found highly rate of pollutant particles like TSP, PM_{10} , $\text{PM}_{2.5}$ in three most traffic of Quetta in agreement with PAK-EPA (2006) and Zaheer and Zulfiqar (2010).

A. The concentration of pollutant NO_2 , TSP, PM_{10} and $\text{PM}_{2.5}$ in sampling site Meezan Chowk

The concentration of pollutant NO_2 , TSP, PM_{10} and $\text{PM}_{2.5}$ in sampling site Meezan Chowk. In Meezan Chowk sample the TSP was found as $1000 \text{ } (\mu\text{g}/\text{m}^3)$, PM_{10} as $300 \text{ } (\mu\text{g}/\text{m}^3)$, $\text{PM}_{2.5}$ as $150 \text{ } (\mu\text{g}/\text{m}^3)$ and NO_2 $69.50 \text{ } (\mu\text{g}/\text{m}^3)$ as demonstrate in Fig. 1.

B. The concentration of pollutant NO_2 , TSP, PM_{10} and $\text{PM}_{2.5}$ in Alamdar Chowk

The concentration of pollutant NO_2 , TSP, PM_{10} and $\text{PM}_{2.5}$ in sampling site Meezanin Alamdar Chowk. In Alamdar Chowk sample, TSP concentration was above $1600 \text{ } (\mu\text{g}/\text{m}^3)$, PM_{10} $700 \text{ } (\mu\text{g}/\text{m}^3)$, $\text{PM}_{2.5}$ $140 \text{ } (\mu\text{g}/\text{m}^3)$, NO_2 $47.28 \text{ } (\mu\text{g}/\text{m}^3)$ as demonstrate in Fig. 2.

C. The concentration of pollutant NO_2 , TSP, PM_{10} and $\text{PM}_{2.5}$ in Sirki Road

The concentration of pollutant NO_2 , TSP, PM_{10} and $\text{PM}_{2.5}$ in sampling site Sirki Road. In Sirki road samples, TSP, PM_{10} , $\text{PM}_{2.5}$ concentration was found as $1100 \text{ } (\mu\text{g}/\text{m}^3)$, $300 \text{ } (\mu\text{g}/\text{m}^3)$, $100 \text{ } (\mu\text{g}/\text{m}^3)$, and NO_2 $30.41 \text{ } (\mu\text{g}/\text{m}^3)$ as demonstrate in Fig. 3.

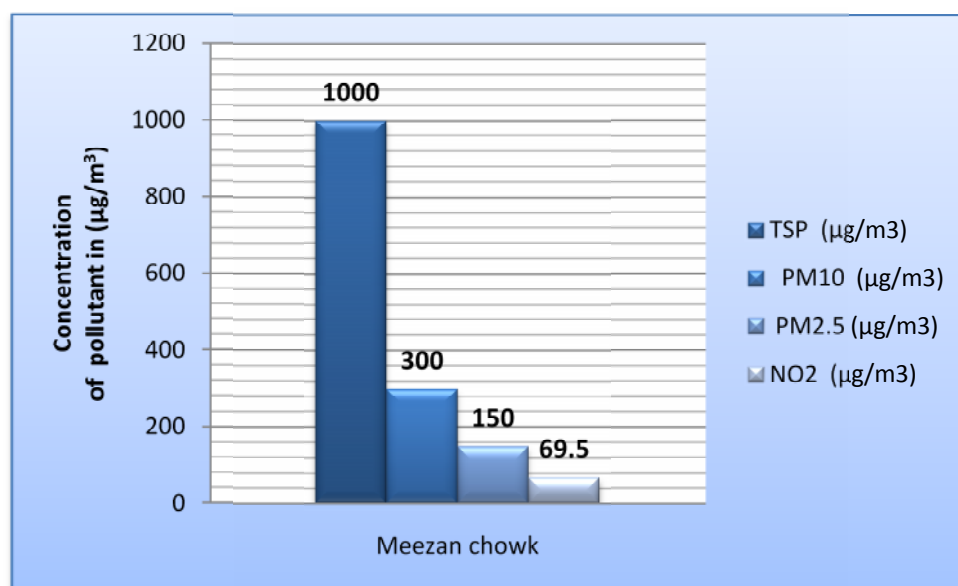


Fig. 1. Concentration of pollutant TSP, PM_{10} , $\text{PM}_{2.5}$, NO_2 in Meezan Chowk.

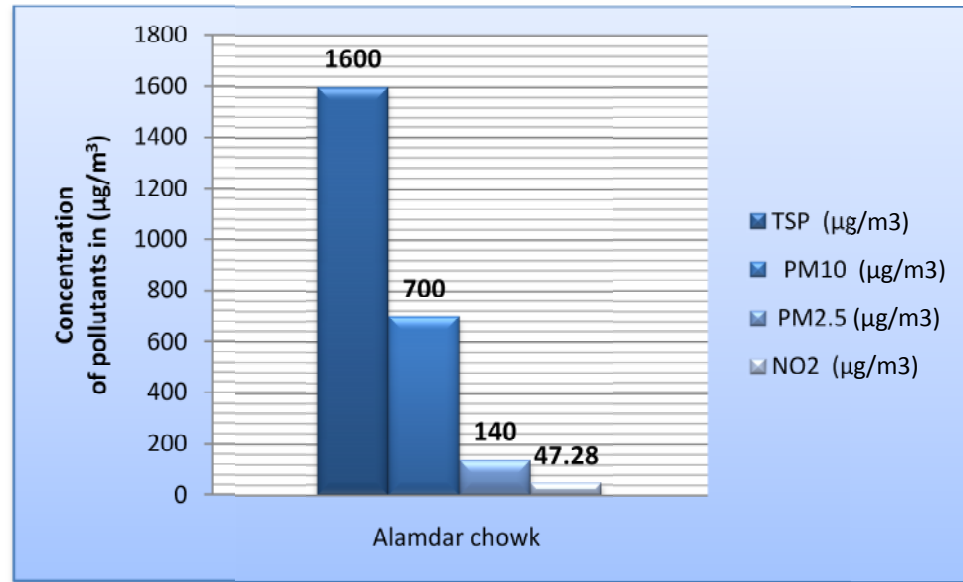


Fig. 2. Concentration of pollutant TSP, PM₁₀, PM_{2.5}, NO₂ in Alamdar Chowk.

D. Average concentration results of the sampling Area's

The average concentration of NO₂ at three selected sampling sites i.e., Meezan Chowk, Alamdar Chowk and Sirki road in Quetta was 69.50, 47.28 and 30.41 (µg/m³), respectively. In Meezan Chowk sample, TSP was found as 1000 (µg/m³), PM₁₀ as 300 (µg/m³) and PM_{2.5} as 150 (µg/m³), whereas in Alamdar Chowk sample, TSP concentration was above 1600 (µg/m³), PM₁₀ 700 (µg/m³) and PM_{2.5} 140 (µg/m³) respectively. In Sirki road samples, TSP, PM₁₀, PM_{2.5} concentration

was found as 1100 (µg/m³), 300 (µg/m³) and 100 (µg/m³) respectively (Pak- EPA 2007). All results of the sampling site were demonstrate in Fig. 4.

Moreover, the Quetta city has a dense transport system that can causing serious damage to urban environment and human health. On the research studies found the strongly effect on human health like blood pressure ENT (eye, nose, and throat) fatigue, diseases like asthma, cardiovascular and cancer were highly in range.

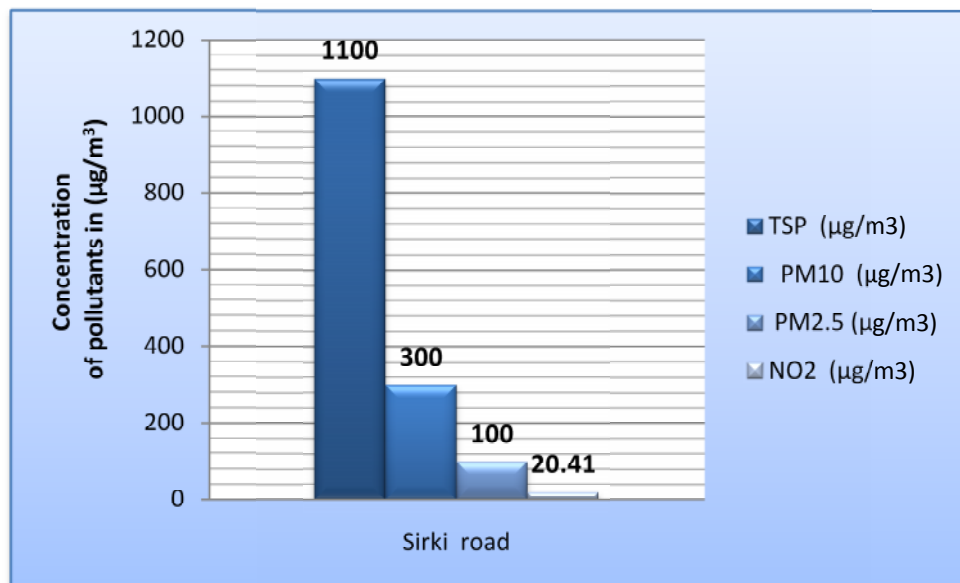


Fig. 3. Concentration of pollutant TSP, PM₁₀, PM_{2.5}, NO₂ in Sirki Road.

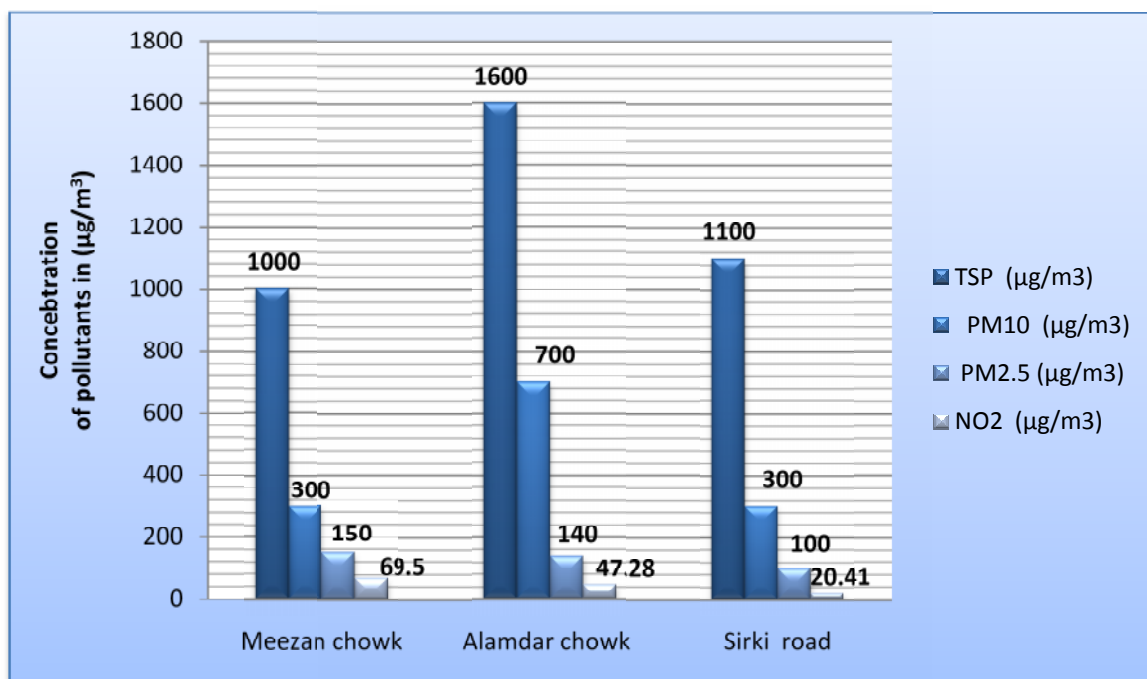


Fig. 4. Concentration of pollutant TSP, PM₁₀, PM_{2.5}, NO₂ in three sampling sites.

CONCLUSIONS

In the present study, It's difficult to measures the air pollution parameters and their effect on local human population in Quetta city. From the results it was concluded that the data based on the traffic stress sites is producing high level of air pollutants in these sampling sites of Quetta city. Three sampling sites of this research report i.e., Meezan Chowk, Alamdar road, Sirki road showed that pollutants such as TSP, N₂O, Pm₁₀, Pm_{2.5} are present in the air of Quetta City due to the traffic stressed, which are producing health serious effects like blood pressure, ENT (eye, nose and throat), fatigue, diseases like asthma, cardiovascular and cancer in local populations. Hence, after this study, we can easily notify that people have lack information about the air pollution and its effects. As the air quality is badly effecting by auto-emission, so there is need to enhance the knowledge about the air pollution and its injurious impact into local communities. Furthermore, stander air pollution control equipment's should refer for automobiles, check and balance for all the automobiles by the traffic controllers, when automobiles producing high pollutants they have pay due to or protector-ship. We should have to addressing about the increasing level of pollution and its effects as well do adapt the prevention measures to get out of this pollution storm and clean air as possible we can.

RECOMMENDATION

- (i) The traffic pollution is basically caused by the emission from the automobiles for that the automobiles production should be consider for better machinery that would be help revolutionize the recover air quality.
- (ii) Traffic Control departments should a wear people about to regulate their car services at least twice in the month.
- (iii) Traffic police have to notice the automobiles by releasing the smoke and pay dues on releasing high amount of smoke into the air.
- (iv) Develop the comprehension of air pollution and its effects among the communities.

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