

RESEARCH ARTICLE

EFFECT OF AIR POLLUTION ON ASTHMA PREVALENCE IN ERBIL CITY, KURDISTAN REGION, IRAQ

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ARTICLE DETAILS

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ABSTRACT

Human health is linked to a number of consequences from air pollution exposure. Research suggests that a child's chance of developing asthma increases with prolonged exposure to ambient air pollution. A child's or adult's asthma morbidity is caused by outdoor air pollution, which also affects lung development. Air pollution in cities is mostly caused by power generation and traffic. There is a growing body of evidence, spanning several decades, that suggests outdoor air pollution can exacerbate pre-existing asthma attacks. Additionally, some studies have suggested that pollution may also play a role in the development of new asthma attacks. Examining how air pollution affects the prevalence of asthma is the goal of this study. We concentrated on clinical data and gathered the annual number of asthmatic patients in Erbil city from 2017 to 2022. The data were gathered from various hospitals in the city, including the Rizgary Hospital. In 2022, the highest recorded number of asthmatics was 4930, with 75% of those individuals being children. Over a six-year period, the average number of asthmatics was 4,471, with 2,763 of those being children, or (61%) of all asthmatics. Based on the information at hand, we came to the conclusion that early life exposure to air pollution is linked to a higher risk of asthma in children.

KEYWORDS

air pollution, asthma, children

1. INTRODUCTION

Air pollution is a problem that exists before written history. Air pollution is the general term for the release of chemicals, particulate matter, and biological materials into the atmosphere that hurt and injure humans and other living things as well as degrade the environment by, for example, causing global warming or ozone layer depletion. (Hutton, 2011; Linhares et al., 2015). Air contamination is the result of hazardous or excessive concentrations of gases, particles, and organic atoms entering Earth's atmosphere. The two main causes of air pollution are human activity and natural processes (Kim, et al., 2018). Pollution comes from a variety of sources, from small amounts of cigarettes and natural phenomena like volcanic eruptions to large amounts of emissions from vehicles and industrial processes (Mueller et al., 2020).

Millions of deaths worldwide occur each year as a result of air pollution, as it is widely known to have long-term effects on the development of diseases like cancer, cardiovascular dysfunction, and respiratory infections and inflammations. A recent study found a connection between male infertility and air pollution. (Lee, and Guo, 2004; Kurt, et al., 2016). The chemical and physical characteristics of air pollutants vary greatly depending on their source. In addition to human activity such as industrial emissions, road traffic, residential heating, shipping, air traffic, construction, agricultural activities, and warfare, natural disasters such as earthquakes, volcanic eruptions, spontaneous forest fires, and extremely high temperatures can also produce outdoor air pollution (Stevens, et al., 2019). Despite occurring independently of human activity, natural hazards are dangerous events that have an impact on human health, the environment, and lives. (Jurewicz et al., 2018).

The primary causes of indoor air pollution include smoking, building

materials, air conditioning, heating, lighting, housecleaning or air-refreshing products, and cooking with coal, wood, or fuel. From a chemical perspective, these pollutants are essentially the evaporated versions of inorganic pollutants, such as ozone (O₃), which is primarily produced by vehicle emissions in urban areas and is the primary cause of smog. Ammonia (NH₃) emission is currently the most common gas-phase alkaline species in the atmosphere. When most of the ammonia released into the atmosphere is converted, particulate ammonium sulfate and nitrate are created. Vapors contain organic pollutants such as benzene, toluene, xylene, and polycyclic aromatic hydrocarbons (PAHs) in addition to carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂) (Koenig, 2000).

On the other hand, the particulate forms of air pollutants usually consist of an inner carbon core surrounded by a variety of organic pollutants and/or heavy metals. (Kim et al., 2018). Epidemiological studies have shown that exposure to gaseous pollutants and PM has been associated, especially in children, with a higher incidence of upper airway symptoms such as rhinorrhea, nasal obstruction, cough, laryngospasm, and vocal fold dysfunction as well as lower airway symptoms such as cough, dyspnea, and wheezing. (Ding et al., 2017). This exposure is also associated with an increase in cough and wheezing in adults with chronic lung disease and in healthy adults (Linhares et al., 2015). consequences for lung health It is not only a quantitative, objective, and early predictor of death and morbidity associated with cardiorespiratory disease, but also a significant marker of the effects of air pollution on the exposed population (Khreis and Nieuwenhuijsen, 2017). Research has demonstrated how pollutants impact pulmonary function in children, adolescents, healthy adults, and those with a history of respiratory disorders both immediately and over time. Lung asthma in relation to air pollution (Celedon, 2006). Studies in toxicology and epidemiology have established a link between air pollution

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and bronchial asthma (Li, et al., 2017).

The authors arrived at this conclusion after reviewing publications from 2006–2007 that examined the effect of residential traffic-related exposures on asthma occurrence and severity (Salam et al., 2008). Residential proximity to traffic sources increases the risk for asthma and asthma exacerbations. Furthermore, a study by found that exposure to CO, NO, NO₂, PM10, SO₂, black carbon, and industrial point sources during the early stages of life was positively associated with asthma, with the strongest associations being noted for pollutants related to traffic (Clark et al., 2010). Earlier this year, in India, according to some studies, the increase in ambient pollutants above national air quality standards may have contributed to an almost 21% rise in asthma admissions (Yadav et al., 2020; Lee, and Guo, 2004).

2. METHOD

Our goal was to evaluate the impact of air pollution on the prevalence of asthma in Erbil. From 2017 to 2022, data on hospital visits due to asthma attacks in adults and children aged 0-17 and in Erbil City was gathered from a few hospitals, including Rizgary Hospital.

3. RESULT AND DISCUSSION

Asthma cases are rising in correlation with air pollution. Examples of this include the dramatic rise in asthma cases worldwide following recent industrial development and the corresponding dramatic rise in pollution concentrations (Balali-Mood et al., 2016). According to a studies, there was a greater impact on children with asthma and air pollution than on adolescents and adults (Faustini, et al., 2013). The purpose of the current study was to determine how air pollution in Erbil City affects asthma in adults and children. Depending on the available data we found that lowest number of asthmatic people (3820) was recorded in 2019 where (43%) of

them was a child under 17 age while the highest number of patient (4930) was recorded in 2022 among them (75%) were child asthma. Generally, the average of asthmatic people from 2017 to 2022 was (4,471), which (1653) of them was adult and (2763) was child that equal to (61%) of total asthmatics (table 1).

We demonstrated that the number of asthmatic children increased overtime (figure 1), because of developing industries, increases of number of traffic that highly effected on air pollution (Khreis and Nieuwenhuijsen, 2017). The exposure to outdoor pollutants (O₃, NO₂, SO₂, CO, PM) could induce asthma symptoms, in addition the increasing prevalence of asthma has paralleled a rapid growth in the number of motor vehicles in use (WHO, 2006; Lee and Guo, 2004; Modig and Forsberg, 2007). Erbil's high traffic volume and electricity production are the main causes of air pollution. The primary causes of air pollution in cities are electricity generation and traffic. Evidence that has been building for several decades supports the theory that outdoor air pollution can exacerbate pre-existing asthma attacks (Guarnieri and Balmes, 2014). Controlling air pollution from coal combustion in homes is crucial for public health because the amount of pollutants released can sometimes surpass that of industrial resources.

Despite increased awareness of its harmful effects on the respiratory system, tobacco smoke is still widely consumed in Asia and contributes to asthma morbidity (Trivedi and Denton, 2019). Since children have higher basal metabolic rates and engage in more physical activity than adults, their respiratory systems may not be as developed as those of adults, making them more vulnerable to air pollution exposure and developing asthma (Ding et al., 2017). On the other hand, smoking tobacco during pregnancy has been demonstrated to increase risk of childhood asthma. Air pollution during pregnancy that alter metabolism increases fetal susceptibility to mineral inhalation and affects placental transportation of oxygen.

Table 1: The prevalence of asthma in adult and children during 2017 to 2022 in Erbil city

Year	No. asthmatics	Adult	Children under 17	% of child
2017	4430	1841	2589	58
2018	4732	2171	2561	54
2019	3820	2143	1677	43
2020	3835	1001	2834	73
2021	4755	1532	3223	67
2022	4930	1231	3699	75
Average	4,471	1653	2763	61

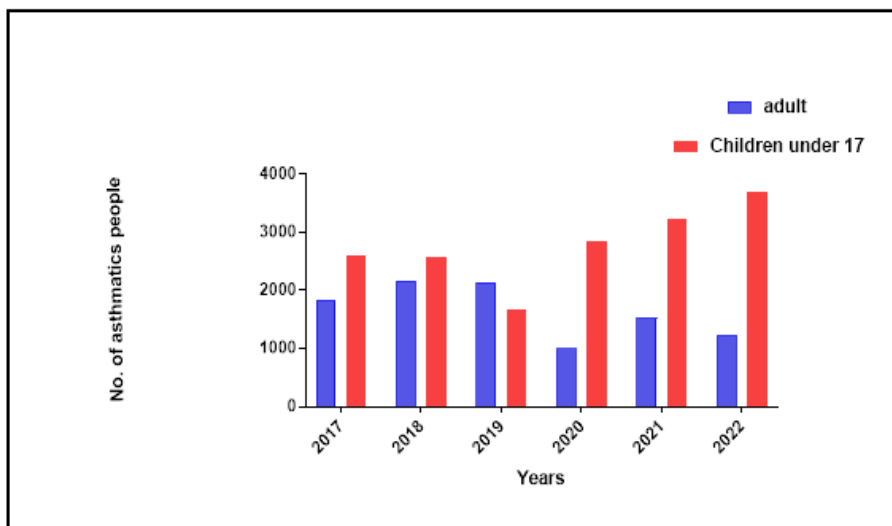


Figure 1: The number of asthmatic children aged fewer than 17 and adult from 2017 to 2022

4. CONCLUSION

The overall negative impact of air pollution on human health has spread around the globe. Due to the fast-paced economic and industrial development, rising traffic, and increased human activity, both indoor and outdoor environments can be sources of air pollution that trigger asthma attacks in both children and adults. It is plausible that certain allowable thresholds for ambient air pollution in Asian nations may not be low enough to safeguard human health. The findings demonstrated that children are more vulnerable to the effects of air pollution than adults are, and that childhood asthma cases are increasing over time.

-Clinicians and pulmonologists need to look into air pollution exposure

and acknowledge it as a risk factor that needs to be considered.

- It's probable that some of the permitted ambient air pollution levels in Asian nations are not low enough to protect human health. Improved technology and governmental regulations are required to lessen the severe suffering and fatalities brought on by air pollution.

-Steer clear of busy intersections, heavily traveled routes, and the sides of a road with higher emissions.

- You can contribute to the long-term improvement of the air quality in your neighborhood by supporting neighborhood garden initiatives. Plants absorb CO₂, which helps to purify the air around them.

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