



RESEARCH ARTICLE

STUDY OF RESPIRATORY HEALTH IN AUTO RICKSHAW DRIVERS IN MUMBAI

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Abstract

Air pollution occurs when harmful or excessive quantities of substances including the gases (CO₂, CO, SO₂, NO, CH₄, CFC, Radon, etc.), particles (both organic and inorganic), and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and even death in humans. Auto rickshaws play an important role in public transport in Mumbai. Auto rickshaw drivers are prone to the road for long hours without any usage of mask this makes them to be the population under risk. In this study auto rickshaw drivers from age 20-60 were chosen to study their respiratory health with the help of St. Georges respiratory scale and their peak flow were assessed with the help of a peak flow meter.

Results: 83% of the study population we can see that the peak flow rate is deteriorating constantly and 17% of the study had less than normal peak flow rate. Maximum of the study population were in there 11-20% of the total score which means they are in the best possible health status as per the St. George's respiratory scale.

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Introduction:-

Air pollution occurs when harmful or excessive quantities of substances including the gases (CO₂, CO, SO₂, NO, CH₄, CFC, Radon, etc.), particles (both organic and inorganic), and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and even death to humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Both human activity and natural processes can generate air pollution [1] Air quality index as of 10th November 2019 135 in Mumbai which is unhealthy for sensitive individuals. [2] The deposition of PM in the respiratory tract depends predominantly on the size of the particles, with larger particles deposited in the upper and larger airways and smaller particles penetrating deep into the alveolar spaces. Ineffective clearance of this PM from the airways could cause particle retention in lung tissues, resulting in a chronic, low-grade inflammatory response that may be pathogenically important in both the exacerbation, as well as, the progression of lung disease. [3] Mounting evidence suggests that air pollution contributes to the large global burden of respiratory and allergic diseases including asthma, chronic obstructive pulmonary disease, pneumonia and possibly tuberculosis. Although associations between air pollution and respiratory disease are complex, recent epidemiologic studies have led to an increased recognition of the emerging importance of traffic-related air pollution in both developed and less-developed countries [4]

Auto rickshaws play an important role in public transport in Mumbai. The overall increase in the past three years has been 97% from 1.05 lakh autos in 2016 to 2.07 lakh in January 2019. [5] Air pollution, airborne allergens, and

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changing weather conditions—alone or in combination—can hinder physical activity. In any active individual, high ozone levels can cause restrictive lung dysfunction, and high carbon monoxide levels can impair oxygen delivery. Sulphur dioxide worsens nasal symptoms in people who have allergies and causes bronchospasm in those who have asthma. Airway irritation from fine particulates can lead to bronchospasm. Atopic individuals suffer from the well-known effects of fungi and pollen. If a change in exercise routine or activity doesn't relieve symptoms, pharmacologic treatment may include antihistamines, immunotherapy, inhaled corticosteroids, and/or inhaled beta-2 bronchodilators. [6] Auto rickshaw drivers are prone to be more immune to these pollutants due to the long hours of working may it be standing in the long hours of traffic when hired or over the stands waiting for a passenger. Therefore, their respiratory health maybe at risk. In this study, we will study the respiratory health of auto rickshaw drivers by assessing their PEFR and using SGRQ scale. The SGRQ scale is designed to measure health impairment in patients with asthma and COPD. SGRQ can be used in normal patients as well to study the prevalence as per a study conducted in Bangalore of auto rickshaw drivers to study the respiratory health. The peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR), is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air. It measures the airflow through the bronchi and thus the degree of obstruction in the airways. Peak expiratory flow is typically measured in units of litres per minute (L/min) . Our aim is to study the Respiratory health in auto rickshaw drivers in Mumbai. Our objectives are

- 1) To study the activity, impact and symptoms with sgrq scale in auto rickshaw drivers
- 2) To study the peak flow rate in auto rickshaw drivers.

Material And Methods:-

An observational study was done on 80 individuals driving autorickshaw in Mumbai. Duration of the study was for 6 months. The subjects were asked if they wanted to be a part of the study, consent forms were filled and after that the questionnaires were filled and peak flow rate was taken one to one basis. The inclusion criteria were 20-60 years of age. Exclusion criteria for anyone who was not willing to participate or had any respiratory disease.

The SGRQ is designed to measure health impairment in patients with asthma and COPD. SGRQ can be used in normal patients as well to study the prevalence as per a study conducted in Bangalore of auto rickshaw drivers to study the respiratory health. It is also valid for use in bronchiectasis and has been used successfully in patients with kyphoscoliosis and sarcoidosis. There is a report of its validation in a small study of adults with cystic fibrosis It is in two parts. Part I produces the Symptoms score, and Part 2 the Activity and Impacts scores. A Total score is also produced. [7]

Peak flow meter:

Peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR), is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air. It measures the airflow through the bronchi and thus the degree of obstruction in the airways. Peak expiratory flow is typically measured in units of litres per minute (L/min)

Green Zone:

80 to 100 percent of your usual or "normal" peak flow rate signals all clear. A reading in this zone means that your asthma is under reasonably good control. Continue your prescribed program of management.

Yellow Zone:

50 to 80 percent of your usual or "normal" peak flow rate signals caution. It is time for decisions. Your airways are narrowing and may require extra treatment. Your symptoms can get better or worse depending on what you do, or how and when you use your prescribed medication. You and your healthcare provider should have a plan for yellow zone readings.

Red Zone:

Less than 50 percent of your usual or "normal" peak flow rate signals a Medical Alert. Immediate decisions and actions need to be taken. Severe airway narrowing may be occurring. Take your rescue medications right away. Contact your healthcare provider now and follow the plan they have given you for red zone readings. [8]

Graph : 1**Inference:**

In graph 1, we can infer that about 35% of the population belongs to the age group range of 31-40 whereas the subject population of 12% belong to the age group of 51-60. Number of smokers and non-smokers

Graph 2**Inference :**

In graph 2, we can infer that 85% of the subject population are non smokers and 15% of the subject population are smokers.

Graph 3**Inference :**

83% of the subject population is in the yellow zone which means their lung volumes are deteriorating and are no more in the normal range and 17% of the subject population is in the red zone where their lung volumes have deteriorated below normal and need to consult a physician.

Graph 4**Inference :**

Maximum of the subject population had total score of between the range of 11-20 i.e. 32 which means they were in the best possible health whereas about 1 % of the subject population falls into the category of 100% in Total score of the scale which is the worst possible health status.

Graph 5**Inference:**

Symptom score and activity score are directly proportional. This shows that as the symptoms increase the activity is becoming difficult to perform.

Graph 6**Inference :**

Impact score is directly proportional to symptom score. This graph shows that as the symptoms increase, the negative impact on the patient has also increased

Table 1:- Awareness Of Mask On A Daily Basis.

AWARENESS OF USING MASK	NO. OF PEOPLE	PERCENTAGE
YES	58	72%
NO	22	28%

Inference :

In table 1, we can infer 72% of the subject population had awareness about using the mask and 28% of the subject population did not know what masks were used for.

Table 2:- Usage Of Mask On A Daily Basis.

USAGE OF MASK ON A DAILY BASIS	NO. OF PEOPLE	PERCENTAGE
YES	0	0%
NO	80	100%

Inference:

In table 2, we can infer all the subject population did not use mask during driving.

Table 3:- Number Of Hours On The Road.

NO OF HOURS ON ROAD	NO OF PEOPLE	PERCENTAGE
0-5	1	1%
6-10	51	63%
11-15	27	33%
16-20	2	3%

Inference :

In table 3, we can infer that 63% of the subject population drives for about in between 6- 10hours where as 1% of the subject population drives for in-between 0-5 hours.

Table 4:- Driving Since How Many Years.

NUMBER OF YEARS	NO OF PEOPLE	PERCENTAGE
1-10years	44	55%
11-20years	29	36%
21-30years	6	8%
31-40years	1	1%

Inference:

In table 4, we can infer that 55% of the subject population has been driving auto rickshaw since 1-10 years And 1% of the subject population has been driving since 31-40years respectively.

Discussion:-

In our study about 35% of the population belongs to the age group range of 31-40 whereas the subject population of 12% belong to the age group of 51-60. A group range between 31-40 are often looking for daily basis income and have been driving rickshaws since few years. 55% of the subject population has been driving auto rickshaw since 1-10 years and 1% of the subject population has been driving since 31-40years respectively. 63% of the subject population drives for about in between 6- 10hours where as 1% of the subject population drives for in-between 0-5 hours. This shows that more than half of the subject population were on the roads for almost 10 hours which means they are at risks of inhaling High levels of ozone and other air pollutants that can cause breathing problems and trigger symptoms if you have a lung condition like asthma, bronchiectasis or COPD.^[9]

We can infer that 5% of the subject population are non-smokers and 15% of the subject population are smokers. The non-smokers had an addiction of either betel leaf. Dennis E. Niewoehner, M.D., Jerome Kleinerman, et al, studied pathological changes in peripheral ways of young cigarette smokers in the new England wherein they found out smoking leads to narrowing of the airways and elevates the destruction of the lung tissue. The characteristic lesion observed was a respiratory bronchiolitis associated with clusters of pigmented alveolar macrophages and was present in the lungs of all smokers studied but rarely seen in non-smokers ($p < 0.002$). The lungs of smokers also showed small but significant increases in mural inflammatory cells and denuded epithelium in the membranous bronchioles as compared to controls ($p < 0.05$)^[10] Although acute episode of respiratory disease rates are higher in subjects with COPD, risk factors are similar, and at a population level, there are more episodes in smokers without COPD.^[11] Although the lung has ways to protect itself from injury by inhaled agents, these defences are overwhelmed when cigarette smoke is inhaled repeatedly over time. After years of exposure to cigarette smoke, lung tissue becomes scarred, loses its elasticity, and can no longer exchange air efficiently.^[12]

None of the subject population did use mask during driving for no matter how many hours they would be on the road. This could be due to the subject population could not afford masks, or did not have the time to buy those. They felt it was awkward or people would think they had some disease and everyone would look at them differently. 72% of the subject population had awareness about using the mask and 28% of the subject population did not know what masks were. This could be as the subject population were uneducated about the usage of mask and how they help them in reducing pollution effects on them. They did not know which masks were appropriate for daily use. Some had misconception that they would feel more suffocated if they wore masks for too long. 83% of the subject population is in the yellow zone which means their lung volumes are deteriorating and are no more in the normal range and 17% of the subject population is in the red zone where their lung volumes have deteriorated below normal and need to consult a physician. Other factors associated with the development of COPD include poor initial lung function, advanced age, male sex, childhood respiratory illness, occupational respiratory exposures, air pollution, low educational attainment or socioeconomic status, blood type A or AB, $\alpha 1$ protease deficiency, and other familial factors^[13] Maximum amount of the subject population falls into the category of 11-20% of the total score in the SGRQ which means the population are not completely healthy and are tending to impaired health. Here Symptom score and activity score are directly proportional. We can see as the symptoms increases the activity is becoming difficult to perform. The symptoms such as wheezing, shortness of breath start to aggravate more as difficult the task gets. We can see that the impact score is directly proportional to symptom score. The symptoms increases, the

negative impact on the patient have also increased. We can see that as the symptoms score increase it leads to more impact in their daily life activities as per SGRQ scale such as leaving outdoors or even doing recreational activities. It shows how the symptoms have impact on their quality of life as whole.

Conclusion:-

We can conclude that the PEFR of the auto rickshaw drivers is deteriorating considerably and their respiratory health is affected. According to their SGRQ scale minimum of the population is heading towards impaired respiratory health. Therefore, there is a need to create awareness about the use of masks and doing regular breathing exercises and lifestyle modification in auto rickshaw drivers.

Limitations:

1. It is self-administered scale so there can be changes in what their actual lung status might be with regards to what their understanding of the questions and their symptoms are.
2. They might not be aware which of the symptoms are more aggravated during a certain activity.

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