



# The Comparative Study of the Spirometric Parameters in Auto Rickshaw Drivers of Rural and Urban Area

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**ABSTRACT**

Auto rickshaw is one of the chief modes of transport in our country and its structure is such that its drivers are constantly exposed to emission of other vehicles, making them susceptible to adverse effects of air pollution from mild rhinitis to carcinogenesis and premature deaths. Hence present study was conducted to evaluate spirometric parameters like forced vital capacity (FVC), forced expiratory volume in one second (FEV1), FEV1/FVC ratio, forced expiratory flow 25-75% (FEF25-75%), peak expiratory flow rate (PEFR) in auto rickshaw drivers of rural and urban area. The spirometric findings of the two groups were analyzed using students unpaired t test. The results showed statistically highly significant (p<0.001) decrease in FVC and FEF25-75% whereas there was significant (p<0.05) decrease in PEFR in auto drivers of urban area as compared to rural area. Conclusion showed that there is obstructive as well as restrictive pattern i.e mixed pattern of lung diseases

**KEYWORDS**

Spirometry, auto rickshaw drivers, obstructive, restrictive, rural, urban

**INTRODUCTION**

As India is developing country, it is experiencing a rapid growth and economic development. Urbanization, industrialization and rise in motor vehicle use have led to increased air pollution. The world health organization (WHO) states that 2.4 million people die each year from causes directly attributable to air pollution.

Environmentalists claim that living in an Indian metropolitan city is like smoking 10 – 20 cigarettes every day. More than 40,000 people die prematurely every year because of air pollution, says a world bank report of which Delhi share is the highest.

Automobile exhaust is a complex mixture of different gases like sulphur dioxide (SO<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM), Hydrocarbons and Ozone (O<sub>3</sub>).

But National Air Quality Program (NAMP) measures mainly four air pollutants viz sulphur dioxide, oxides of nitrogen, suspended particulate material (SPM), respirable SPM (<10microns) for ambient air quality.<sup>6</sup>

Auto rickshaw drivers are constantly exposed to emission of his own and other vehicles making them susceptible to adverse effects of air pollution than the general population. The human lungs inhale on an average 7 liters of air per minute. Thus, it is evident that lungs are the target organs for adverse effects of noxious gases due to air pollution. Thus we have undertaken this study to study the effect air pollution on spirometric parameters of auto rickshaw drivers of rural and urban area.

**OBJECTIVE:**

To measure and compare spirometric parameters viz. FVC, FEV1, FEV1/FVC, PEFR and FEF25-75% in non smoker auto rickshaw drivers of rural and urban area with age, location, gender and BMI matched controls.

**MATERIALS AND METHOD**

This study is a cross sectional comparative study. The study was conducted on the field for the collection of

data of rural auto rickshaw drivers and in the Department of Physiology for the collection of data of urban auto rickshaw drivers after getting approval from Institutional Ethics Committee.

**Inclusion criteria** : male, non smoker auto rickshaw drivers of rural and urban area who were driving for 8 – 10 hours per day between the age group of 25 -50 years of age and BMI upto 29.99 kg/m<sup>2</sup>. **Exclusion criteria** : Smokers, hypertensive, diabetics, acute or chronic respiratory disorders, congenital or acquired chest or spine deformity like kyphosis, scoliosis or pigeon chest or recent trauma or operation of chest.

The study protocol was explained in detail to the selected subjects and with informed written consent the study was carried out. The pulmonary function parameters were measured using a computerized RMS Helios 702 (Chandigarh) Spirometer according to American thoracic society (ATS) and European Respiratory Society (ERS) guidelines.<sup>9</sup>

**TABLE 1: Comparison of baseline characteristics in auto rickshaw drivers of rural and urban area.**

Parameter	Rural auto rickshaw drivers Mean ±SD	Urban auto rickshaw drivers Mean ±SD	P value
Age (yrs)	41.61±7.82	41.46 ±8.70	>0.05 (NS)
Height (m)	1.62 ± 0.09	1.64 ± 0.08	>0.05(NS)
Weight (kg)	65.62 ± 8.33	64.56 ±7.12	>0.05(NS)
BMI (kg/m <sup>2</sup> )	23.24 ± 3.24	23.75 ± 2.5	>0.05(NS)

P >0.05 = non significant (NS)

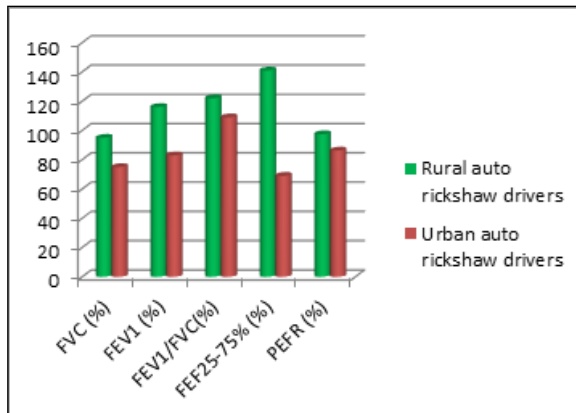
**TABLE 2: Comparison of spirometric parameters in auto rickshaw drivers of rural and urban area.**

Parameter	Rural auto rickshaw drivers Mean±SD	Urban auto rickshaw drivers Mean ±SD	p value
FVC	95 ± 8.84	75 ± 6.73	<0.01**
FEV1	116 ± 5.75	83 ± 14.25	> 0.05

FEV1/FVC	122± 20.47	109 ± 21.41	>0.05
FEF 25-75%	141± 10.62	69 ± 8.21	< 0.01 **
PEFR	97.45±17.21	86.32±13.48	< 0.05*

P < 0.05\* =significant, p < 0.01\*\* highly significant

**FIG 1: show bar diagram comparing spirometric parameters in auto rickshaw drivers of rural and urban area.**



## RESULTS :

Table 1 shows the comparison of baseline parameters like age (years), height (meters), weight (kg) , body mass index(kg/m<sup>2</sup>) in auto rickshaw drivers of rural and urban area. Both groups were compared using 'Students unpaired t test' for statistical analysis.

P value between the two groups is >0.05, that means there is non significant difference in two groups, hence the two groups are comparable.

Table 2 shows comparison of dynamic spirometric parameters like Forced vital capacity (FVC), forced expiratory volume at first second (FEV1), FEV1/FVC, forced expiratory flow between 25-75% (FEF25-75%),Peak expiratory flow rate (PEFR)

There is non significant decrease in FEV1 and FEV1/FVC.

There is significant decrease in PEFR (p<0.05) whereas there is highly significant decrease in FVC and FEF25-75% (p<0.01%)

## DISCUSSION:

Most components of vehicular exhaust are oxidant in nature and are highly reactive oxygen species (ROS). These ROS are free radicals that cause injury in tissues through membrane damaging processes leading to cell dysfunctions.

Sudhir Gavali et al , studied the prevalence of restrictive lung disorders in 100 auto rickshaw drivers .They showed significant reduction in FVC,FEV1 and PEFR where FEV1/FVC% did not show any significant change (P>0.05). Thus showing that auto rickshaw drivers are having mostly restrictive pattern of lung disease

Aditya Jain, Ramta Bansal, Avinash Kumar, K D Singh studied the respiratory effects of air pollutants among non smoking auto rickshaw drivers of Patiala city. They found significant decrease in the FVC,FEV1 and PEFR values of the 150 auto rickshaw drivers who were continually exposed to air pollutants as compared to that of controls. However we do not find significant decrease in FEV1.

Rajkumar and his co workers studied pulmonary function parameters in auto rickshaw drivers of Delhi. He found 80% of auto rickshaw drivers were having mild to moderate to severe obstruction.<sup>13</sup>

Amrith Pakkala , Thippeswamy Raghavendra et al carried out similar comparative study in urban and rural cab drivers. They found statistically significant decline in the dynamic pul-

monary function parameters in the study group when compared to controls.

Many studies have been carried out to study effect of air pollution in urban population of various professions as compared to their controls , most of them found mixed pattern of lung disease i.e obstructive plus restrictive impairment is seen.

## CONCLUSIONS

There is significant reduction in PEFR of urban auto rickshaw drivers as compared to rural area indicating involvement of large airways. There is highly significant reduction in FVC and FEF25-75% in urban auto rickshaw drivers as compared to rural area. Decreased FVC suggests restrictive pattern of lung disease whereas decreased FEF25-75% indicates involvement of smaller airways. Thus we observed mixed pattern of lung disease i.e restrictive plus obstructive lung disease due to involvement of lung parenchyma as well as larger and smaller airways respectively.

Apart from the concentration of vehicles in urban areas, other reasons for increasing vehicular pollution are the types of engine used, age of the vehicle, congested traffic and poor road conditions, outdated automotive technologies, traffic management system and adulterated fuel and heavy industrialization.

## PREVENTIVE MEASURES:

CNG type of engines should be used to reduce air pollution. Car pooling can be done to reduce the vehicular load and thus air pollution. Strict laws for proper disposal and renewal of outdated vehicles. Regular health check up to prevent permanent lung impairment. Health education.

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