

# Comparative Study of Peak Expiratory Flow Rate (PEFR) in Water Pipe Smoker, Cigarette Smoker and Non-Smoker Healthy Young Adult

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**Abstract:** **Background:** Health problem caused by cigarette smoking is widely described; but very few investigations for water-pipe smoking. This study was designed to investigate the effect of cigarette smoking and water pipe smoking on peak expiratory flow rate. **Aims And Objectives:** To compare peak expiratory flow rate in water- pipe smokers, cigarette smokers and non-smoker healthy young adults. **Materials And Methodology:** The cross-sectional study will be done on a random sample 90(30 in each group) from different area of Ahmedabad city. After collecting the required data, peak expiratory flow rate of the young adult(18-35 years) was recorded by Peak flow meter. **Result:** PEFR showed significantly affected in both groups with mean 398.2 L/min in group A and 349.50L/min in group B and 310.50 L/ min in group C. **Conclusion:** Study concluded that PEFR is more affected in in cigarette smokers but the group of hookah smokers also has significant reduction in PEFR.

**Keywords:** Peak expiratory flow rate, water-pipe smokers, cigarette smokers

## 1. Introduction

Tobacco use causes many of the world's leading lethal ailments, including cardiovascular disease, chronic obstructive pulmonary disease, and lung cancer.<sup>(1)</sup> Cigarette smokers have a higher prevalence of respiratory symptoms (RS) and lung function abnormalities, greater annual rates of decline in forced expiratory volume in 1 s (FEV1) and greater chronic obstructive pulmonary disease-related mortality than non-smokers.<sup>(2)</sup>

Smoking with water pipe also known as hookah, shisha, goza, narghile and hubble bubble. Water pipe tobacco smoking is considered less harmful than cigarette smoking; but study suggested that nicotine content is 2-4% higher than cigarette; CO level is also 3 times higher than cigarette. The amount of tar and smoke of coal is with harmful products like Polycyclic Aromatic Hydrocarbon (PAH), benzene, nitric oxide, heavy metals.<sup>(3,4)</sup> Smokers usually use 10–20 g of tobacco when smoking a WP, and the duration of smoking is 40–50 min. The smoke passes through water in the body of the pipe, is diluted and cooled, and soluble compounds are dissolved.<sup>(5)</sup>

Research in the past have documented credible evidence that WPS is detrimental to health, with associations to Chronic Obstructive Pulmonary disease, heart disease, hypertension, abortions in women and cancers including lung, esophageal, gastric & bladder.<sup>(6)</sup> Other studies have also connected WPS to otitis media, gum disease, cancers of the lip and buccal and transmission of infections including Tuberculosis & Hepatitis C.<sup>(5,1)</sup>

In spite of research revealing the health hazards of WPS, public awareness and knowledge about this practice is still rather limited. Such research would be of great use to policy makers Key words Waterpipe Smoking Cardiovascular Respiratory Health particularly for adolescents and young

children who are prone to rebellion and engage in such harmful practices. Several studies have reported the effects of WP smoke on pulmonary function tests (PFT), small airways function and tonicity of the bronchial tree.<sup>(7)</sup>

Peak expiratory flow rate (PEFR) is used to monitor airway obstruction, assess its severity and variation and evaluate the effects of treatment. Earlier studies have reported that Cigarette Smoking reduces the PEFR<sup>(8)</sup> but there are fewer evidences regarding the hazardous effects of Water pipe smoking also regarding the comparison of effects of both types of smoking.

Therefore the present study is aimed to compare the effects of Water pipe smoking in terms of PEFR with respect to duration of smoking. Cigarette smoking and non-smoker group were studied for comparison.

## 2. Material and method

After receiving approval from the institutional ethical committee participants were screened as per the inclusion and exclusion criteria's as described below. Those willing to participate in the study were briefed about the nature of the study in the language best understood by them and a written informed consent was obtained. The demographic data, smoking history and PEFR readings were taken in sitting position. The study was a cross-sectional comparative study, conducted in the different area of Ahmedabad.

### Inclusion Criteria

- GROUP A: Non- smoker healthy young adults. (18-35 years)
- Group B: water pipe smoking (since 1 year; 3days/week; min 30min/session)
- Group C: Cigarette smokers (since 1year; min 1 pack/week)

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**Exclusion Criteria:**

- Individual with cardio-vascular, metabolic, systemic conditions.
- Individual doing exercise regularly.
- Individual working in any industries which generates fumes or dusts.
- Obese individual.
- Passive smokers.

**Outcome Measure:**

Peak Expiratory Flow Rate (PEFR) was measured by peak flow meter by cipla which is used to assess the airflow obstruction. Its reliability is 0.7 and validity is 0.94.<sup>(9)</sup> The best of three reading was considered. Participants were asked to breathe in from the nose and blow out forcefully through mouth in the device. The normal range for adults is  $\geq 700$  l/min to 850 l/min.<sup>(10)</sup>

**3. Statistical Analysis**

Statistical analysis was done by SPSS version 16.40 males, 20 females matched for age, height, weight, socioeconomic status and physical activity completed this study. The number of cigarette smoked per day among 20 smokers was average 5 cigarettes per day (average 20cigarettes/week); the average time among 20 water pipe smokers was average 30 min/day.

Null Hypothesis: There is no difference between the three groups.

Level of significance= 95 % (0.05).

Various statistical measures such as mean, standard deviations (SD), test of significance were utilized to analyze the data. Non-parametric data were analyzed with Friedman test.

**4. Result**

Statistical analysis showed that the PEFR showed significantly affected in both groups with mean 398.2 L/min in group A and 349.50L/min in group B and 310.50 L/ min in group C

**Table1:** Mean and Standard deviation of PEFR.

	N	Mean	Std.Deviation	Minimum	Maximum
PEFR A	20	398.25	58.944	300	475
PEFR B	20	349.50	57.900	250	450
PEFR C	20	310.50	60.738	2000	450

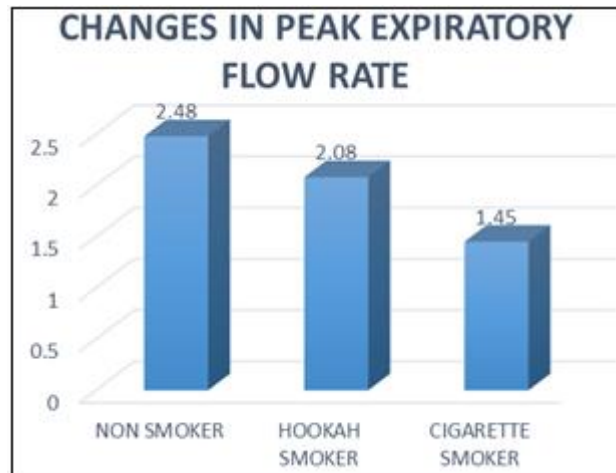
**Table 2:** Friedman Test.

	Mean Rank
PEFR A	<b>2.48</b>
PEFR B	<b>2.08</b>
PEFR C	<b>1.45</b>

**Table 3:** Test Statistics

N	20
CHI-SQAURE	<b>11.699</b>
DF	<b>2</b>
ASYMP.SIG.	<b>.003</b>

The P value less than the selected significant level (0.05); the null hypothesis is rejected. There is a significant difference of peak expiratory flow rate between three groups.



**Figure 1:** Mean of Peak expiratory flow rate.

**5. Discussion**

The nicotine content in the tobacco for a water-pipe is  $2\pm 4\%$  and for cigarettes  $1\pm 3\%$ <sup>(11)</sup>. Because of the differences in content and smoking pattern of these two kinds of tobacco, water-pipe smoking should be investigated for its effects on pulmonary functions.

The charcoal used to heat the tobacco can raise health risks by producing high levels of carbon monoxide, metals, and cancer-causing chemicals, polycyclic aromatic hydrocarbon (PAH) formed during incomplete burning of coal which has effect on skin, body fluid, immunity as well as it has a carcinogenic effect.<sup>(6)</sup>

The result of the study suggest that there is a significant difference of peak expiratory flow rate between the three groups. The mean rank and the overall values of the PEFR is lowest in the cigarette smokers but mean rank of hookah smoker group also suggest significant reduction than the non-smoker group. The result suggest that though cigarette smokers have lowest PEFR hookah smokers don't have the normal range of PEFR compare to non-smokers which may be due to the inflammation and small airway obstruction.

Hookah smoking is more n deep inspiration smoking than cigarette so it has more harmful effect on small airways. Due to that lung airways get inflamed and irritated which causes narrowing of airways and decreased airflow.

The study supporting this result was done by Meo et al. which stated that tobacco is no less toxic in a water pipe smoking than in a cigarette, and the water in the water pipe smoking does not filter out the toxic ingredients in the tobacco smoke. WPS may actually inhale more tobacco smoke than cigarette smokers do because of the large volume of smoke they inhale in one smoking session, which can last as long as 60 minutes.<sup>(12)</sup>

For water-pipe smoking, dependency on special café as and the required length of time required to finish a jurak limits the amount of smoking. The inhalation pattern of water-pipe smoking is shorter and more superficial than that of cigarette smoking.

Two investigations from Turkey have been presented at International conferences.<sup>(13,14)</sup> In one, only PEF was measured<sup>(13)</sup>. Their results were contrary to our study. However the limited number of smokers and the absence of a control group were the shared handicaps of these studies.

The main finding of our study is peak expiratory flow rate was found to be more significant in cigarette smokers than water-pipe smokers when compared to non-smokers. Although it is difficult to explain the reasons exactly without estimating possible mechanisms in detail, the results of the recent study have proven that water-pipe smoking does not affect peak expiratory flow rate as seriously as cigarette smoking does. This may be because the water-pipe smoking allows small airway inflammation to heal (due to intermittent smoking), or because smoke does not reach the lower airways (due to the smoking pattern), or because it is less damaging to the airways (due to the filtration of smoke).

## 6. Limitation of the Study

Limitation of the study includes small sample size and social status of participants was not considered. In future, a study can be carried out on large sample size and by assessing the pulmonary function tests to get the clear picture regarding the lung volume capacities and using other outcome measures.

## 7. Clinical Implication

This study indicates cessation of both cigarette smoking and water pipe smoking. This should be added as an integral part of patient education, treatment & awareness. Since the peak expiratory flow rates are low in both CS & WPS the smokers should be educated about its hazardous effects. Breathing exercises and adaptation of healthy lifestyle should be encouraged.

## 8. Conclusion

With support from past studies, the results from our research compromise the idea that the Water pipe smoking also has harmful effects on health. Results revealed that Water pipe does have the potential to induce effects on the cardiovascular and respiratory. Education on Hookah smoking should target youth population, as they are the ones more likely to take up the activity and more receptive to newly taught information. Prevention is the key. We should focus on teaching smokers how to quit smoking properly, informing that switching to supposed low nicotine alternatives (eg. Hookah) is not an effective to quit smoking and in fact maybe more harmful to health as it causes smokers to take deeper breaths and thus take in large quantities of harmful constituents.

## 9. Conflict of Interest

None

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