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Original Research Article

Effects of Waterpipe Smoking and Cigarette Smoking on Peak Expiratory Flow Rate and Quality of Life

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ABSTRACT

BACKGROUND: Water pipe smoking nowadays is becoming a popular alternative to cigarette smoking. Many people also believe water pipe smoking to be safer than cigarette smoking leading to tolerance of the practice. However, while water pipe smoking also utilizes smoking of tobacco but when compared with cigarette smoking, there are fewer evidences pointing towards the hazardous effects of water pipe smoking. This study was aimed to compare the effects of cigarette and water pipe smoking on peak expiratory flow rate (PEFR) & quality of life (QOL).
MATERIALS AND METHODS: This cross-sectional study included 100 chronic cigarette and water pipe smokers fulfilling the eligibility criteria. The outcome measures assessed were peak expiratory flow rate [PEFR] and SF 36 quality of life questionnaire [SF-36 QOL].
RESULTS: A statistically significant difference was seen in PEFR & QOL in both the groups but more affected in water pipe smokers, except for the two components of SF36 QOL questionnaire viz. pain, energy & fatigue.
CONCLUSION: The PEFR & QOL is affected more in water pipe smokers as compared to cigarette smokers. Hence, it is a myth that water pipe smoking is not as addictive and harmful as smoking a cigarette.

***KEY WORDS*:** Waterpipe smoking [WPS], Cigarette smoking [CS], peak expiratory flow rate [PEFR], quality of life [QOL].

INTRODUCTION

Tobacco smoking is the practice of burning tobacco and inhaling the smoke. Smoking is the most common method of inhaling tobacco. [1] It is a well known fact that cigarette smoking is injurious to health since it causes many diseases especially lung diseases and harms nearly every organ of the body and reduces the health of smokers in general. [2]

Water pipe tobacco smoking also known as a hookah, shisha, goza, narghile commonly known as water pipe smoking (WPS), is considered by many people to be less harmful than cigarette smoking (CS), leading to tolerance of this practice. [3] It has been practiced extensively for about 400 years. [3] It has been claimed that more than 100 million people worldwide smoke water pipe smoking daily. With globalization and immigration, water pipe smoking spread all over the world, notably among the youth. [4] A major factor responsible for the spread is public misconceptions about the health risks of WPS. It was perceived that WPS is less harmful and less addictive than cigarette smoking with the belief that harmful substances are being filtered out through the

water bowl, and thought that WP is more socially acceptable than cigarettes representing a good opportunity for gathering of friends and family. [5,6] While there is a large amount of data regarding the acute and chronic effects of cigarette smoking, there is a paucity of data regarding the water pipe smoking.

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 CS reduces the PEFR [7,8,9] but there are fewer evidences regarding the hazardous effects of WPS also regarding the comparison of effects of both types of smoking.

Quality of life (QOL) has become an important measure of outcomes across all medical specialties, in both research and clinical settings. QOL data promotes smokers and practitioners to become more sensitive to the sub-clinical adverse effects of cigarette smoking, thereby improving motivation to quit, cessation rates, and treatment outcomes. Very few studies have done the research relevant to QOL in smokers. [10,11,12] Also there is hardly any evidence comparing the QOL amongst waterpipe and cigarette smokers.

Therefore the present study was aimed to compare the effects of WPS and CS in terms of PEFR and QOL.

MATERIAL AND METHODS

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. Participants were asked to fill the SF36 quality of life questionnaire according to their present performance in day to day life.

The study was a cross-sectional comparative study, conducted in Pune region. Participants included were those in age group 20-36 year old males, having minimum 3 to maximum 6 years of exposure to water pipe smoking or cigarette smoking & those with regular intake of water pipe or cigarette smoking. Participants were excluded if they had any respiratory diseases, consuming both water pipe and cigarette smoking, undergoing medical treatment which may alter the present performance (e.g. individuals on bronchodilators). Then the participants were divided into two groups by purposive sampling method. The two groups are Group A containing cigarette smokers [n=50] and Group B having water pipe smokers [n=50].

Outcome measures:

Peak Expiratory Flow Rate (PEFR) was measured by peak flow meter by meditech® which is used to assess the airflow obstruction. Its reliability is 0.7 and validity is 0.94. [13] The best of three reading was considered. Participants were asked to breathe in from the nose and blow out forcefully thru mouth in the device. The normal range for adults is ≥700 l/min to 850 l/min. [14]

SF-36 questionnaire was used to assess the quality of life, participants were told to fill it according to their present health condition and preferences. Its reliability and validity is correlation coefficient ranging from 0.81-0.88. This questionnaire contains 36 items, which are eight scaled scores, which are the weighted sums of the questions in their section; each scale is transformed into 0-100 scale on the assumption that each question carries equal weight. The lower the score the more the disability, and the higher the score the less the disability i.e., a score of zero is equivalent to maximum disability and a score of 100 is equivalent to no disability. [15]

The eight components of SF36 are as following:

1. Physical functioning [10-items]
2. Role limitations due to physical health [4-items]

3. Role limitations due to emotional problems [3-items]
4. Energy and fatigue [4-items]
5. Emotional well being [5-items]
6. Social functioning [2-items]
7. Pain [2-items]
8. General health [6-items]

STATISTICAL ANALYSIS

Statistical analysis was done by Graph pad Instat software version 3.06. The data was entered into an excel sheet, tabulated and subjected to statistical analysis. The results were calculated to be statistically significant with p value <0.0001. Various statistical measures such as mean, standard deviations (SD), test of significance were utilized to analyze the data. Parametric data was analyzed by unpaired t test & nonparametric data by Mann-Whitney U test.

RESULT

Statistical analysis showed that the PEFR showed significantly affected in both groups with mean 394.60±61.21 L/ min in group A and 346.60 ± 55.57 L/ min in group B.

Table 1: PEFR comparison of group A & group B

PEFR	Group A	Group B	p-value	Statistical significance
MEAN ± SD	394.6 ±61.21	346.6 ± 55.57	< 0.0001	Significant

Table2: SF36 QOL of group A & group B

SF36QOL component	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value	Statistical significance
Physical functioning (PF)	72.52 ± 12.60	62.40 ± 51.17	< 0.0001	significant
Role Limitations Due to Physical Health (RLPH)	70.50 ± 37	45 ± 34.62	< 0.0001	significant
Role Limitations Due to Emotional problems (RLEP)	75.33 ± 34.21	51.99 ± 42.14	0.0006	significant
Energy and Fatigue(EF)	55.20 ± 11.24	58.50 ± 12.09	0.2269	Not Significant
Emotional Well being (EWB)	60.40 ± 10.00	57.49 ± 11.31	0.0957	Not Significant
Social Functioning(SF)	57.75 ±14.48	49.35 ± 12.98	0.0021	Significant
Pain(P)	65.65 ± 19.79	67.22 ± 17.09	0.9559	Not Significant
General Health(GH)	56.41 ± 13.28	50.29 ± 11.57	0.0327	Significant

DISCUSSION

This study examined the peak expiratory flow rate & quality of life in chronic WPS & cigarette smokers. Both the groups showed reduction in PEFR and QOL than normal ranges available but WPS showed more reduction in PEFR & 6 components of SF36 QOL questionnaire, namely PF, RLPH, RLEP, SF, GH compared to CS group. Although CS showed more impairment in pain, energy & fatigue component, EWB than WPS.

The PEFR shows significant decline in the values in both WPS and CS which may be due to the inflammation and airway obstruction**.** It is more reduced in WPS. 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. [16]

In another study, Wasim Maziak, et al. reported that water pipe tobacco smoking produces dramatic increases in expired air carbon monoxide due to the perforated aluminum foil which separates the burning charcoal from the flavored tobacco which is inhaled by the smoker affecting the respiration. [4]

Fahed Hakim in his study has given estimates of the equivalence between cigarette smoking and water-pipe smoking vary between 2 & 10 cigarettes for occasional and daily water-pipe smokers, & 100 puffs per water-pipe smoking session . In a 50-60 minute hookah session, smokers are exposed to 100-200 times the volume of smoke inhaled from a single cigarette. This study showed that one session of WPS causes acute biologic changes that might result in marked health problems like decrease in forced expiratory flow, PEFR,

FENO levels, percentage of eosinophils in peripheral blood, and 8-isoprostane levels in EBC. [3]

In present study, the QoL was also affected negatively in both groups but WPS showed more reduction in 6 components out of 8 components.

Physical functioning & role limitations due to physical health are more affected in WPS as compared to CS**.** This is in accordance with the study of Anong Tantisuwat et al. who stated that a reduction in the chest expansion arising from reduced chest wall motion and flexibility would affect the performance and work of breathing therefore affecting the physical performance. [17]

Role limitations due to emotional problems in this WPS are more affected as compared to CS. In a study, Lamin et al. stated about the body's dependence on drug, when a few minutes of nicotine pleasure is indulged consistently, it may eventually lead to stress and feeling of isolation, but also it varies from person to person whether to allow emotional problems to interfere with work life or not, therefore according to RLEP component the WPS are more prone to limit their work or other activities due to emotional problems. [18]

Social function in which the WPS were more affected as compared to CS. This may be attributed to the individual's social status, which was very subjective. This could reflect the social acceptance of waterpipe leading to its predominance.

General health is more affected in WPS as compared to CS. The scoring of general health depends on the individual's preference i.e. how the subject perceives his/her health.

Energy & fatigue was affected more in CS as compared to WPS but statistically the difference was not significant. This may be due to different endurance and fatigue levels depending on the individual's daily activities. Study done by FI Hawari et al. stated that the Habitual waterpipe tobacco smoking in young seemingly healthy individuals is associated with a greater burden of respiratory symptoms and impaired exercise capacity hence resulting into fatigue. [19] Corwin EJ, Klein et al has concluded cigarette smoking as a risk factor for fatigue in men. [20]

Emotional wellbeing was affected in both WPS and CS without statistically significant difference. Giannakopoulos et al conducted a study on Emotional, behavioral problems and cigarette smoking in adolescence and concluded that smoking is associated with emotional/behavioral problems. [21]

In Pain component the CS showed more Pain interference than WPS in their daily living with no significant difference which could be attributed to different pain threshold for different individual.

Hence this study stated that the PEFR and QOL were affected in both the groups, but the WPS showed more reduction in PEFR and the QOL in terms of physical functioning, role limitation due to physical health and emotional problems, & social functioning except for Pain, Emotional well being, Energy & Fatigue components in which they were equally affected in both the groups.

Limitations 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.

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.

CONCLUSION

The study concludes that the peak expiratory flow rate (PEFR) and quality of life (QOL) is affected more in water pipe smokers as compared to cigarette smokers.

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