April 2012

Water pipe smoking amongst the university and college students of Karachi, Pakistan

Shehla Batool Jaffri
Dubai Health Authority

Aisha Yousuf
Aga Khan University

Waris Qidwai
Aga Khan University

Pakistan Journal of Chest Medicine, 2012 April-June; 18(2): 13-19

WATER PIPE SMOKING AMONGST THE UNIVERSITY AND COLLEGE STUDENTS OF KARACHI, PAKISTAN

Shehla Batool Jaffri[*], *Aisha Yousuf*[**], *Waris Qidwai*[*]

ABSTRACT

Background:
An extensive literature search revealed that water pipe smoking is an emerging health risk and deserves the attention of health professionals. This study was therefore undertaken to determine the frequency of water pipe smoking among students in college and universities of Pakistan and to assess the practices, knowledge and attitude towards water pipe smoking among them.

Method:
A cross sectional survey was conducted in the College and Universities of Karachi, Pakistan from April 2009 to October 2009. Students were selected through non probability sampling and given self administered questionnaire after the informed consent.

Result:
A total of 422 students participated with response rate of 92.08%.Overall prevalence of water pipe smoking was found to be 45.2 % with current water pipe smokers of 16.5% males and 5.7% females (p=<0.001). About 39.3% (160/407) of them were found to have inadequate knowledge and 64% had positive attitude about water pipe smoking. Inadequate knowledge and negative attitude towards water pipe smoking is significantly associated with current water pipe smoking than former or ever water pipe smokers (p=<0.001).

Conclusion:
Inadequate knowledge and social acceptability of water pipe smoking and the male gender are leading to high current smoking tendency among young adults in Karachi, Pakistan

Key Words: water pipe smoking, young adults, knowledge, attitude, Pakistan

Background:
Globally 4.9 million deaths yearly are attributed to tobacco use, and 70 percent of these deaths are likely to occur in developing countries. Water pipe smoking (WPS) also known as Shisha, Narghile, Ghoza and Hookah, is one of the commonest methods of tobacco use in developing countries for about 400 years[1]. Its popularity had been waning till 1980 but in recent years there has been a renovation of water pipe smoking, especially among formative years and its use is assumed to be more socially acceptable[2,3]

Water pipe contains 10 grams to 20 grams of tobacco[1]. Its smoke also contains hundreds of potentially dangerous substances including carbon monoxide, charcoal, nicotine, arsenic, cobalt, chromium and

[*] Family Medicine, Primary Health Center, Dubai Health Authority, United Arab Emirates.
[**]Department of Family Medicine, Aga Khan University, Karachi, Pakistan, Convener: Working Party on Research of World Organization of Family Doctors (Wonca) and Faculty of Family Medicine at College of Physicians and Surgeons, Pakistan

One water pipe corresponds to an average of around 70 cigarettes and one hour of water pipe smoking period comprises of inhaling 100-200 times the smoke inhaled with a single cigarette. A report cited by French anti-tobacco agency stated that smoking water pipe gives off as much carbon monoxide as 15 to 52 cigarettes and as much tar as 27 to 102 cigarettes [2-4].

Researchers reported a greater percentage of chronic bronchitis among water-pipe smokers as compared to cigarette smokers[5]. Water pipe smoke is a mixture of tobacco and charcoal that are toxic and cancerous substances [6]. It increases risk of lung, oral and gastro-esophageal cancers as compared to non-smokers [6-9].Elevations in heart rate and systolic, diastolic, mean arterial blood pressure and coronary heart diseases were found after water pipe smoking [6,10,11]

Pregnant females smoking more than one water pipe in a day were at 2.4 times increased risk of having low birth weight infants as compared with non-smoking mothers [12].For children it can cause ear and chest infections, worsening of asthma and sudden infant death syndrome[5].

Gum diseases have been reported to be five times more common among water pipe smokers than in cigarette smokers [13].

WPS is incorrectly perceived as being less addictive and less damaging than cigarette smoking [14, 15].Research on the knowledge of harmful effects of WPS in comparison to cigarettes is regrettably less. Studies in Egypt, Israel and Syria, shows 21 percent to 50 percent young adults considered WPS less risky than cigarette smoking[2,3,16] . However, more than two third of Egyptian WPS users knew that water pipe increases the risk of lung cancer, asthma, heart disease, and infection spread [2].Where as in Pakistan, knowledge about the effects on heart and cancers of WPS among medical students were found to be 28 percent to 48 percent [17,18].

Water pipe users generally believed that the toxins in the smoke are filtered out by the water in the pipe, although this is not true, the amount of tar in the smoke is largely unaffected by presence of water [19].

Prevalence of water pipe smoking among young adults in Middle East ranges from 19 percent to 54 percent with 31 percent to 63 percent among males and 23 to 69 percent among females [3,20-23].Very few studies have been done for the prevalence of water pipe smoking in Pakistan. On an average, one in five Pakistanis have consumed more than hundred cigarettes or water pipe smoking in his lifetime. Proportion of cigarette smokers was significantly higher in males (60%) while water pipe smoking was more in females (62%) [24].A study on medical and dental students of Karachi revealed 22.7 percent of the students were water pipe smokers [17]. Another study found 27 percent water pipe smoking among adolescents [18]. One recent study among medical and non medical students showed overall prevalence of 53.9 percent of ever water pipe smokers with significantly higher among non medical and male students[25].

A study amongst university students and café customers in Syria found a seasonal pattern of water pipe use, which was associated with exams and stress. The same study also showed more tolerance towards WPS for women than for men in general [20].

Intentions leading to water pipe smoking other than stress were outings with friends, boredom and wasting time [20, 25, 26].

In Pakistan about 75 percent to 80 percent of the water pipe smokers of adolescent age group and medical students used to smoke in restaurants or water pipe cafes [17, 18].

The use of water pipe is rapidly gaining appreciation in Pakistan. In spite of being harmful, it is perceived as being less harmful [25]. WPS is a budding health risk so deserves attention of health professionals and researchers. To the best of our literature search few studies have investigated people's knowledge, attitudes and patterns of WPS. One study was done to see the impact of awareness sessions of WPS harmful effect and showed some significant post session positive response toward water pipe smoking [18]. This present study is motivated to determine the practices, knowledge and attitudes of WPS to identify factors responsible for initiation and maintenance of WPS that will help in development of prevention and cessation strategies for WPS.

Methods and Materials

Study Design and Setting:

It was a cross- sectional survey conducted at College of Business and Management, Preston University and University of Karachi in Pakistan.

Sample Size and Sampling Method:

The sample size calculation was based on findings from previous literature [16, 28, 29] regarding frequency of practices, knowledge attitude and practices of WPS. A sample size of 385 was calculated at a 95% confidence interval and 5% sample error, assuming a 50% variance. With the addition of 10% for the non-response rate, the required sample size would be at least 422 study subjects. Equal number of students would be taken from each institute (140 + 141 + 141) to make a total of 422 students. Non probability purposive sampling was used in order to draw the sample. Data was collected from April 2009 to October 2009. Students registered with the above mentioned institutions who gave written consent were included in the inclusion criteria.

Once granted permission by college and university authorities, students were approached in their respective campuses. All the students were directly approached by the principal investigator in their classrooms, cafeterias and corridors in their respective institutes. In the one-to-one meetings with them, they were explained the purpose of the study and were handed over the self administered questionnaire after obtaining consent. The questionnaire was filled by the students in about 10-15 minutes while the principal investigator was present to ensure that questions were understood by all the students.

Apart from the socio-demographics the questionnaire was consisted of three parts: Practice related, Knowledge related and Attitude related.

The first part was on practices of WPS, its frequency in a week, age at initiation, money spent on WPS, smoking companion, parent's awareness for WPS, sharing of WPS with others, presence of cigarette smoking.

The second part was on knowledge related questions about health hazards of WPS, contents of water pipe smoking, whether sharing of water pipe smoking can cause communicable diseases like hepatitis B, C or not and whether it is more harmful in comparison to cigarette smoking.

Last part consisted of questions to measure the attitudes towards WPS by asking opinions regarding banning of WPS in public gardens, workplaces, restaurants and among age less than 18 years.

Data Management and analysis:

Data was entered and analyzed using Statistical Package for the Social sciences (SPSS) version 17.

Mean and standard deviation of continuous variables such as age and monthly pocket money on WPS was calculated. Proportion of categorical variables such as ethnicity and gender was determined. Frequencies of all the questions related to knowledge, attitudes and practices were calculated.

Chi square test was used to determine the association between socioeconomic strata and other variables with current WPS and p-value <0.05 was considered significant.

All the correct answers related to knowledge of WPS and positive attitudes towards water pipe smoking were summed up and scores were dichotomized based on the median split of the scores. Questionnaire included 18 knowledge related and 10 attitude related questions which were scored and each correct response was given 1 mark and 0 was given for each incorrect response. Knowledge scoring of more than 9 was considered having adequate knowledge and attitude scoring of more than 5 were labeled as having positive attitude towards WPS.

Ethics Statement:

Ethical considerations, such as permission were taken from college/ university authorities and informed consent and confidentiality of the subjects were ensured. For this reason limited demographic information was collected to ensure the anonymity of the respondents and to encourage participation and honest reporting**.** All efforts were made in this study to fulfill the ethical considerations in accordance with the 'Ethical principles for medical research involving human subjects' of Helsinki Declaration [26].

Results

Out of 442, 407 students completed the survey questionnaire (response rate of 92.08%). We already added 10% for the non response rate during sample size calculation so we considered the missing data of 15 students insignificant which is less

than 10% of the total sample size. The mean age of the students were 21.6 years (range: 16 to 46 years) with the female to male ratio of 1.09 (females 52.3%, males 47.7%). The average monthly income or pocket money was almost 4500 Pakistani rupees. 70.8% of the students were Urdu speaking, while the remaining was speaking other languages e.g., Punjabi, Sindhi etc.

Of the 407 students surveyed, 184 (45.20%) were found to be ever WPS smokers (both genders). Among males the prevalence of ever WPS was 30% while for females it was 15.2 % (p =<0.001). Current smokers constituted 90 (22.1% among both genders), whereas 55 (13.5%) males and 39 (9.6%) females reported as being former WPS smokers (p =<0.001). Age at the initiation of water pipe smoking was less than 20 years in 80% of the students. Ten years was the lowest reported age at initiation. When inquired about the factors which led to initiate WPS, 42.9% (79/184) of the respondents started just out of curiosity, 33.1% (61/184) started because of pleasure seeking, 18.4% (34/184) started due to boredom, 14.6% (27/184) started because they were previous cigarette smokers, 14.6% (27/184) started because of peer pressure and just 10.3% (19/184) thought that they started because of stress. Table 1 shows the pattern of WPS among current and former 184 young adults and its relation to the smoking status.

About 39.3% (160/407) of the students found to have inadequate knowledge about WPS and its distribution among male and female is shown in figure 1. Females were found to be significantly knowledgeable about WPS (p=0.002).

Table 2 shows the 18 knowledge items of water pipe smoking and its association with current WPS status. Those who have never smoked were found to have significantly more knowledge about WPS as compared to ever water pipe smokers(p=<0.001). Knowledge about the harmful effect of WPS on heart and lung cancers and those who knew about the contents of WPS was significantly associated with never smoking status.

Regarding attitudes towards WPS about 64.1% (261/407) showed positive attitude (towards non-use and unacceptability of WPS) and its distribution among the male and female is shown in figure 2. Females were found to have significantly more positive attitude than males about WPS (p=<0.001). Table 3 shows the 10 attitude related items of water pipe smoking and its association with current WPS status.

Discussion

To the best of our knowledge, the present study is one of the few that deal with practices, knowledge and attitudes towards water pipe smoking among students.

The overall prevalence of WPS was found to be 45.2 percent which is higher than the other studies reported among the adolescents and medical students at Karachi, Pakistan which ranges from 22.7% to 27% that may be due to the fact that medical students were more aware of health hazards and consuming lesser water pipes[17,18]. However the prevalence was more or less equivalent to the recent studies in Pakistan

among medical and non medical students and the Middle East WPS prevalence [20-23, 25, 26]. It may be due to the fact that more WPS restaurants are now available.

On the other hand prevalence of current smokers (22.1%) in our study found to be little higher than adolescents in Pakistan [18].It shows that consumption of water pipe smoking is increasing with the age, might be due to more independence with age and hence more exposure to water pipe.

Our study showed a significant large variation in WPS users according to gender, more in males which was consistent with the results in previous Middle East studies and Pakistani studies among students [7, 17, 21, 25, 26]. Whereas studies done in Israel and Kuwait, reported that females were heavier smokers than males, of either water pipe or cigarette smoking [3, 23]. This could be due to the social unacceptability of water pipe smoking in females and not in males in Pakistan.

In the present study we found almost 80% of the water pipe smokers initiated water pipe smoking at age less than 20 years that is similar to the Syrian population and students in Pakistan [17, 20, 25]. The results are consistent in each study so age 20 and less is the high risk group identified for practicing water pipe smoking.

From this study it appears that overall daily smokers were less than occasional smokers amongst both ex-smokers and current smoker's group, but those who had quit WPS were significantly found to be occasional smokers than the daily smokers, who did not quit smoking. On the other hand medical students in the previous study were more daily smokers [17]. It means occasional smoking habit helps in quitting WPS.

Our study found out that almost half of the student started WPS out of curiosity and one third to seek pleasure and the remaining due to boredom, stress and peer pressure. While study on medical students showed 90 % of the students started WPS due to influence of friends [17]. Differences of starting intentions could be due to differences in knowledge among different students like general students did not know anything about WPS therefore they were curious and started it while the medical students had no curiosity about it, they just started it as the influence of their social circle.

Most of the students in our study used to share same mouthpiece for WPS with others that is consistent with sharing WPS habit in Middle East [3, 21]. This sharing habit is significantly found more among current WPS status than those who had quited WPS status. It means that those who avoid sharing are knowledgeable about the sharing hazards and could also know about harmful effects of WPS and hence most of them quited WPS.

Most of the student started WPS in a company of friends. Those students who were either alone or with parent at the time of WPS had quitted WPS already. These results suggest that company of friends is a potent stimulus for continuing WPS and therefore WPS cessation programs should aim at banning WPS at social places.

Presence of current WPS is significantly found more among cigarette smokers which is similar to previous studies[17,20,26]. It means those who take one form of nicotine are highly prone to have another form as well.

Our study precisely reported that 60.7% of the students had adequate knowledge about water pipe smoking which was less than knowledge among medical students[17]. Students who had good knowledge were significantly found in the group who had never smoked water pipe. Knowledge about harmful effects on health, effects on heart, association with the lung cancers, contents of WPS and harmful effects of sharing WPS in causing communicable diseases were significantly found more in never smokers. However knowledge about effect on pregnancy and oral cancers was not significant in the students who had quit WPS. Therefore lack of knowledge could be one of the most essential factors which have to be dealt with to encounter the rising prevalence of WPS.

Concerning attitudes towards water pipe smoking this study found 64% of the students to have positive attitude towards water pipe non use and its unacceptability which is significantly high among never smokers.

Most of the students supported banning of water pipe at workplace and among minors (<18 years of age) and half of them at restaurants as well.

The strength of our study is our sample size and the questionnaire. The questionnaires had a wide range of answers to choose and were assessed by scoring system.

The limitation of our study is the study design. The cross-sectional nature of the study does not enable us to prove casual relationship between knowledge and behavior, and attitudes and behavior. Only associations can be identified. It was convenient sampling that would not reflect the true targeted population. We selected the youth from college or universities so the results could not apply to adults who were not getting higher education.

Conclusion: High prevalence (45.2%) of water pipe smoking is observed in students of Karachi, Pakistan. Almost 40% of the students were found to have inadequate knowledge about water pipe smoking. One of the alarming sign is age of initiation of water pipe smoking which was reported as less than 20years in 80% of the students. This mode of smoking is rapidly increasing in Pakistan as a fashion and as a status symbol.

Recommendations: Young adult's water pipe smoking is the leading preventable cause of future morbidity and mortality. Programs should be organized by government and Nongovernmental organizations to increase the awareness of smoking hazards especially among young students.

Another strategy by government could be the banning of water pipe smoking restaurants, its advertising and raising taxes on all tobacco products.

Health professionals can also play a role in advising not only against cigarette smoking but also strongly against water pipe smoking.

List of Abbreviations

WPS Water Pipe Smoking
CI Confidence Interval

Competing Interests: The authors declare that they have no conflicts of interest.
Financial Disclosure: No external funding sources for this study.
Authors' contributions: Dr Shehla Batool was involved in study design and conception, data collection, data entry, data analysis, manuscript writing and editing. She also drafted the questionnaire. Dr Ayesha Yousuf was involved in data analysis, manuscript writing and editing. Dr Waris Qidwai was involved in manuscript writing, revision, editing and overall supervision. All authors have read and approved the final manuscript.

Acknowledgements: Acknowledgement to Agha Khan University as Dr Shehla Batool and Dr Ayesha Yousuf were Family medicine trainee at the time of data collection.

References

1. Global Youth Tobacco Survey Collaborating Group. Differences in worldwide tobacco use by gender: findings from global youth tobacco survey. J Sch Health 2003; 73: 207-15.
2. Israel E, EL-Setouhy M, Gadalla S, Aoun el SA, Mikhail N, Mohamed MK, Water pipe (sisha) smoking in cafes in Egypt. J Egypt Soc Parasitol. 2003 dec; 33(3 suppl):1073-85.
3. Varsano S, Ganz I, Eldor N, Garenkin M. Water-pipe tobacco smoking among school children in Israel: frequencies, habits, and attitudes. *Harefuah. 2003;* 142: 736-41.
4. French National Laboratory Report [Internet], Shisha smoking is more harmful than cigarettes. Published on 27 Nov 2007 [Cited on June 16th 2012]. Available from URL: http://www.asiaone.com/Health/News/Story/A1Story20071101-33613.html
5. Mohammad Y, Kakah M, Mohammad Y. Chronic respiratory effect of narguileh smoking compared with cigarette smoking in women from the East Mediterranean region. *Int. J. Chron. Obstruct. Pulmon Dis.* 2008 sept; *3*: 405-414.
6. Shihadeh A. Investigation of mainstream smoke aerosol of the argileh water pipe. *Food ChemToxicol.* 2003;41:143–152
7. Koul PA, Hajni MR, Sheikh MA, Khan UH, Shah A, Khan Y et al. Hookah Smoking and Lung Cancer in the Kashmir Valley of the Indian Subcontinent. Asian Pacific J Cancer Prev.2011; 12:519-524
8. Gunaid AA, Sumairi AA, Shidrawi RG, al-Hanaki A, al-Haimi M, al-Absi S, et al. Oesophageal and gastric carcinoma in the Republic of Yemen. Br J Cancer1995; 71: 409-10.
9. Gupta PC, Murti PR, Bhonsle RB. Epidemiology of cancer by tobacco products and the significance of TSNA. Crit Rev Toxicol 1996; 26:183-98
10. Shafagoj YA, Mohammed FI. Levels of maximum end-expiratory carbon monoxide and certain cardiovascular parameters following hubble bubble smoking. Saudi Med J. 2002;23:953–958

11. Jabbour S, El-Roueiheb Z, Sibai AM: Narghile (water-pipe) smoking and incident coronary heart disease: a case-control study. *Ann Epidemiol* 2003; 13:570
12. Tamim H, Yunis KA, Chemaitelly H, Alameh M, Nassar AH. Effect of narghile and cigarette smoking on newborn birth weight BCOG international journal of abstetrics and gynaecology 2007;115;91-97
13. Natto S, Balijoon M, Bergström J. Tobacco smoking and periodontal health in a Saudi Arabian population. *J Periodontol* 2005;76:1919-26
14. Jackson D, Aveyard P. Waterpipe smoking in students: prevalence, risk factors, symptoms of addiction, and smoke intake. Evidence from one British university. *BMC Public Health.* 2008;May 22; 8:174.
15. Hammal F, Mock J, Ward KD, Eissenberg T, Maziak W. A pleasure among friends: how narghile (water pipe) smoking differs from cigarette smoking in Syria. *Tob Control.* 2008 apr;17:e3.
16. Maziak W, Eissenberg T, Rastam S, et al. Beliefs and attitudes related to narghile (waterpipe) smoking among university students in Syria. Ann Epidemiol 2004;14:646–54.
17. Khan N, Siddiqui MU, Padhiar AA, Hashmi SAH, Fatima S, Muzaffar S. Prevalence, knowledge, attitude and practice of Shisha smoking among medical and dental students of Karachi, Pakistan.J Dow Uni Health Sci. 2008;2(1):3-10.
18. Anjum Q, Ahmed F, Ashfaq T. Knowledge, attitude and perception of water pipe smoking (Shisha) among adolescents aged 14-19 years. J Pak Med Assoc. 2008;58(6):312-317
19. Neergaard J, Singh P, Job J, Montgomery S. Waterpipe smoking and nicotine exposure: a review of the current evidence. *Nicotine Tob Res.* 2007;9:987-994.
20. Asfar T, Ward KD, Eissenberg T, Mazaik W. Comparison of patterns of use, beliefs, and attitudes related to water pipe between beginning and established smokers. BMC Public Health 2005;5(9): 5-19.
21. Maziak W, Fouad FM, Asfar T, et al. Prevalence and characteristics of narghile smoking among university students in Syria. *Int J Tuberc Lung Dis.* 2004;8:882–889
22. Tamin H, Terro A, Kassem H, et al. Tobacco use by university students, Lebanon, 2001.*Addiction 2003;* 98:933-939.
23. Memon A, Moody PM, Sugathan TN, el-Gerges N, al-Bustan M, al-Shatti A, et al. Epidemiology of smoking among Kuwaiti adults: prevalence, characteristics and attitudes. *Bull WHO.* 2000;78:1306–1315.
24. Alam SE. Prevalence and pattern of smoking in Pakistan. J Pak Med Assoc 1998;48:64-6.
25. Jawaid A, Zafar AM, Rehman TU, Nazir MR, Ghafoor ZA, Afzal O, et al. Knowledge, attitudes and practice of university students regarding water pipe smoking in Pakistan. Int J Tuberc Lung Dis, 2008; 12(9):1077–84.
26. Amin TT, Amr MAM, Zaza BO, Suleman W. Harm Perception, Attitudes and Predictors of Water pipe (Shisha) Smoking among Secondary School Adolescents in Al Hassa, Saudi Arabia. *Asian Pacific J Cancer Prev. 2010;* 11:293-301

27. World Medical Association Declaration of Helsinki. Available from URL: http://www.wma.net/en/30publications/10policies/b3/index.html. Accessed on: Dec 10th 2008
28. Maziak W, Ward KD, Soweid RA. Tobacco smoking using a water pipe: a re-emerging strain in global epidemics. Tobacco control. 2004; 13:327-33.
29. Chaaya M, Chemaitelly H, Azar G. Argileh smoking among university students: A new epidemic. Nicotine and Tobacco Research. 2004; 6(3):457-63.

Figure Legends

Figure 1: Bar chart showing Knowledge distribution of Water Pipe smoking among young adults in respect to Gender. (submitted as a separate file)

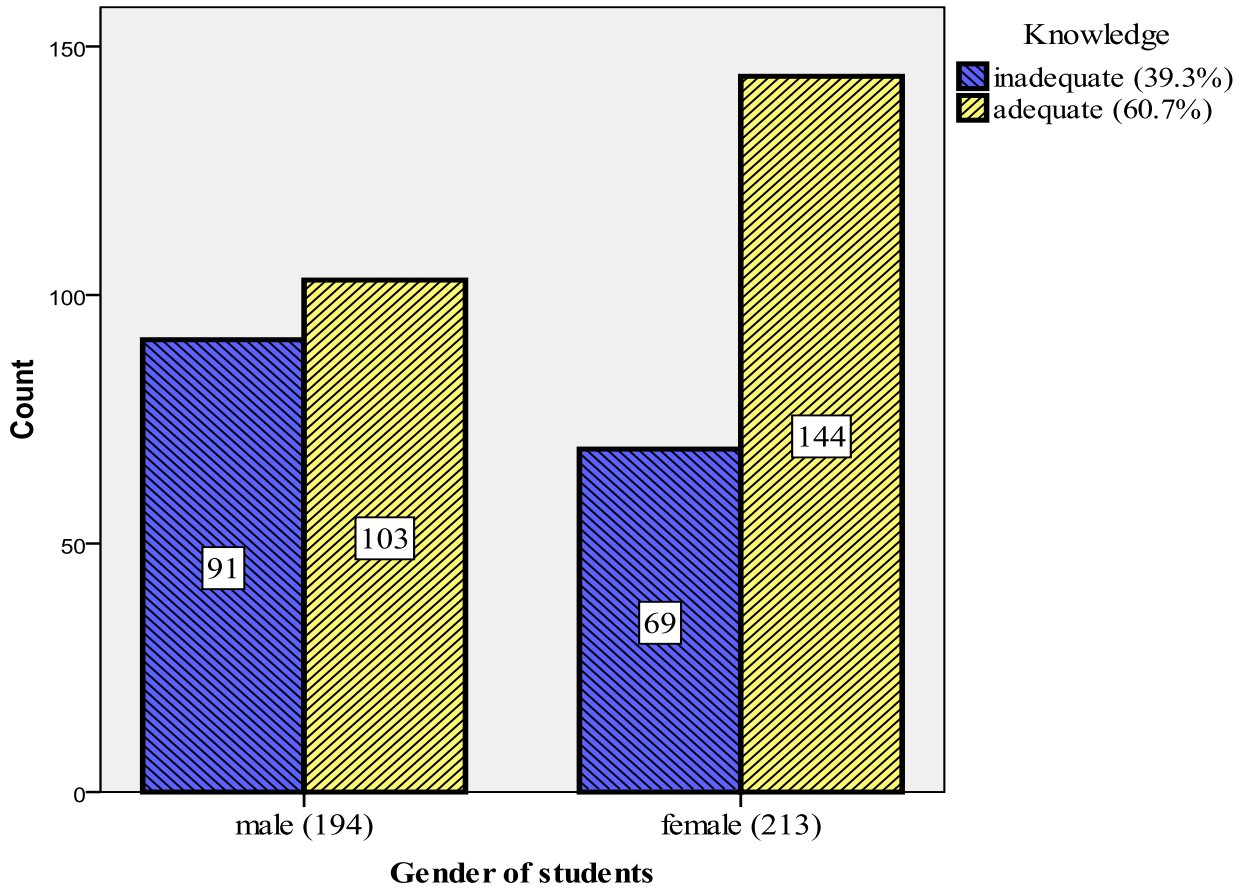

Figure 1: Knowledge distribution of water pipe smoking among 407 male and female adults

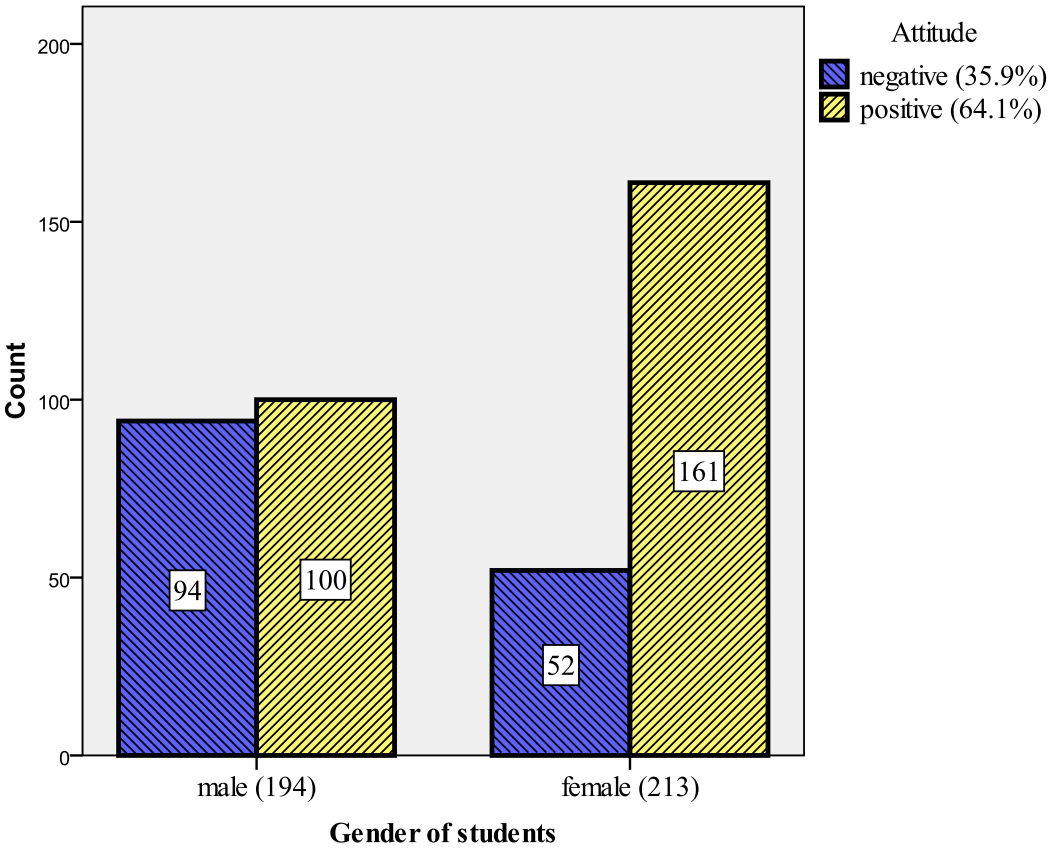

Figure 2: Attitude distribution towards water pipe smoking among 407 youg adults

Figure 2: Bar chart showing Attitude distribution of Water Pipe smoking among young adults in respect to Gender

Table 1: Pattern of Water pipe Smoking among study population in relation to 184 current and quit smoking statuses

Smoking characteristics P value	WPS status	
	Current WPS	Quit WPS
	N=90 (%)	N= 94 (%)
Frequency of WPS 0.039*		
Daily	6(3.3)	4(2.2)
1-2 times/ week	13(7.1)	4(2.2)
Occasionally on gatherings	71(38.6)	86(46.7)
Sharing of WPS with others 0.001*		
Yes	80(43.6)	66 (35.5)
No	10(5.4)	28(15.2)
Companion at time of starting WPS 0.036*		
Alone	1(0.5)	5(2.7)
With friends	89(48.4)	85(46.2)
With parents	0(0.0)	4(2.2)
Parent's awareness of WPS 0.086		
Yes	55(29.9)	47(25.5)
No	35(19.0)	47(25.5)
Presence of cigarette smoking 0.005*		
Yes	40(21.7)	24(13.0)
No	50 (27.2)	70(38.0)

*significant p-value: <0.05

Table 2: Knowledge regarding water pipe smoking among study population and its association with current WPS status

Knowledge items	Correct responses			Total Correct responses	P value
	Current WPS	Quit WPS	Never WPS		
WPS is harmful to health (correct)	64(15.7)	76(18.7)	195(47.9)	335(82.3)	0.003*
Passive WPS is harmful (correct)	60(14.7)	66(16.2)	175(43.0)	301(74.0)	0.149
WPS can cause heart diseases (correct)	25(6.1)	52(12.8)	101(24.8)	178(43.7)	0.001*
WPS can cause Asthma (correct)	57(14.0)	69(17.0)	162(39.8)	288(70.8)	0.212
WPS can cause lung cancer (correct)	51(12.5)	70(17.2)	174(42.8)	295(72.5)	0.001*
WPS can cause adverse effects in pregnancy (correct)	19(4.7)	33(8.1)	72(17.7)	124(30.5)	0.081
WPS can cause kidney diseases (incorrect)	73(17.9)	81(19.9)	192(47.2)	346(85.0)	0.348
WPS can cause oral cancers (correct)	23(5.7)	34(8.4)	81(19.9)	138(33.9)	0.166
WPS can cause hepatitis B or C (incorrect)	8(2.0)	7(1.7)	32(7.9)	47(11.5)	0.143
WPS can cause joint diseases (incorrect)	82(20.1)	90(22.1)	208(51.1)	380(93.4)	0.449
WPS can cause Diabetes (incorrect)	82(20.1)	93(22.9)	215(52.8)	390(95.8)	0.024*

WPS mainly contains tobacco (correct)	45(11.1)	48(11.8)	157(38.6)	250(61.4)	0.001*
WPS contains cancer producing chemicals (correct)	15(3.7)	36(8.8)	107(26.3)	158(38.8)	0.000*
WPS contains fruit flavors only (incorrect)	21(5.2)	23(5.7)	86(21.1)	130(31.9)	0.007*
WPS containspoisonousgases(correct)	22(5.4)	22(5.4)	74(18.2)	118(29.0)	0.120
WPS contain juices or soft drinks (incorrect)	65(16.0)	69(17.0)	169(41.5)	303(74.4)	0.780
WPS sharing can cause communicable diseases (correct)	36(8.8)	41(10.1)	128(31.4)	205(50.4)	0.007*
WPS is less harmful than cigarette smoking (incorrect)	29(7.1)	39(9.6)	98(24.1)	166(40.8)	0.159
Total adequate knowledge	37(9.1)	55(13.5)	155(38.1)	247(60.7)	0.000*

*significant p-value: <0.05

Table 3: Attitudes towards Water pipe Smoking among study population and its association with current WPS status

Attitude items	Positive responses			Total positive responses	P value
	Current WPS	Quit WPS	Never WPS		

Image of a man smoking water pipe	21(5.2)	62(15.2)	199(48.9)	282(69.3)	0.000*
Image of a woman smoking water pipe	35(8.6)	70(17.2)	202(49.6)	307(75.4)	0.000*
Accept WPS offer by a best friend	11(2.1)	24(5.9)	144(35.4)	179(44.0)	0.000*
Smoke WPS in future	10(2.5)	46(11.3)	177(43.5)	233(57.2)	0.000*
WPS is a sign of high social status	53(13.0)	67(16.5)	148(36.4)	268(65.8)	0.175
Woman can do WPS but not cigarette	43(10.6)	53(13.0)	146(35.9)	242(59.5)	0.012*
WPS is good stress coping strategy	32(7.9)	64(15.7)	159(39.1)	255(62.7)	0.000*
Banning WPS in work place	47(11.5)	69(17.0)	177(43.5)	293(72.0)	0.000*
Banning WPS in restaurants	19(4.7)	44(10.8)	161(39.6)	224(55.0)	0.000*
Banning WPS in minors (<18years)	62(15.2)	71(17.4)	184(45.2)	317(77.9)	0.026*
Total positive attitude	19(4.7)	55(13.5)	187(45.9)	261(64.1)	0.000*

- significant p-value: <0.05