KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING SMOKING AMONG MEDICAL STUDENTS IN PAKISTAN

Barkat Ali Babar
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Faculty of Health Sciences
University of Eastern Finland
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Instructors: Dr. Sohaib Khan, PhD and Emma Kwegyir-Afful, MPH
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Smoking prevalence is not only common among the general population but also among medical students and health professionals as well. As medical students and doctors are role models for their patients, if they smoke, it will definitely jeopardize their roles as counsellors for their smoking patients. Knowledge and attitude of medical students regarding the health effects of smoking and associated risks and their own smoking status play an important role in interaction with smoking patients in the future.

The main aim of this study is to assess the knowledge, attitude and practice regarding smoking among medical students in Pakistan. A cross-sectional survey was conducted at Khawaja Muhammad Safdar Medical College (KMSMC) of Sialkot city of Pakistan in December 2015 by using a self-administered questionnaire containing 36 questions. There were 306 respondents out of 500 students, giving a response rate of 61%.

Although all the medical students had good knowledge about the harmful effects associated with smoking, smoking prevalence had ascending trend among medical students as the students were promoted from pre-clinical year (12.7%) to clinical year (23.3%) of medical course. As the students were promoted from lower to higher professional year, participation in anti-smoking campaigns were also declined. More than 90% of medical students thought that if medical students or physicians smoke it will convey a negative message to their patients as well as to the public. Overall smoking prevalence among 306 medical students was 13.4% which was low. Male medical students were more than 5 times likely to smoke (34.2%) as compared to female medical students (6.2%). Out of total sample, very few students (1.6%) thought that smoking is beneficial during examination period for coping with anxiety and stress of examination.

In nutshell, the contents of the medical school’s curriculum were not sufficient to let medical students to abstain from tobacco usage. There should be inclusion of subjects and compulsory training in medical curriculum which can improve their roles as a physician in near future to deal with their patients who use tobacco. Participation of medical students in anti-smoking campaigns, programs and policies should be made compulsory during their medical education period.
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List of Abbreviations

BC - Before Christ
CDC - Centers for Disease Control and Prevention
COPD - Chronic Obstructive Pulmonary Disease
CVD - Cardiovascular Diseases
DALY - Disability Adjusted Life Years
ETS - Environmental Tobacco Smoke
GYTS - Global Youth Tobacco Survey
KMSMC - Khawaja Muhammad Safdar Medical College
MBBS - Bachelor of Medicine, Bachelor of Surgery
PKR - Pakistani Rupee
PMDC - Pakistan Medical and Dental Council
SES - Socioeconomic Status
SHS - Second Hand Smoke
USA - United States of America
UK - United Kingdom
WHO - World Health Organization
1 INTRODUCTION

Smoking can be defined as a practice of burning a substance and inhaling the smoke. This is done with the aim to taste the smoke and absorb the substance into blood stream for desired effects. Various substances are smoked, but the most common substance used for this practice is tobacco. The use of tobacco for this purpose dates back to 5000-3000 BC (Gately 2001).

Presently, tobacco smoking has been associated with a large number of adverse health events. However, the first association of tobacco smoking was identified by German scientists in the latter half of 1920s. In the era of Second World War, they led the first anti-smoking campaign. (Procto2000) The first definitive knowledge of association between tobacco smoking and malignancy (lung malignancy) came as early as 1950s from the British physicians. Since then evidence has been continuing to mount till date (Doll et al. 2004, da Costa e Silva 2015).

As reported by World Health Organization (WHO) 2015, case fatality rate in case of tobacco (smoking) addiction is more than 15%. Estimates in 2015 have shown that 6 million people die as a result of direct cost of tobacco smoking (or other less common addiction methods). More than 3/4th of all such deaths are due to direct smoking causes; and the rest are attributed to passive smoking. Nearly 80% of smokers are residents of low or middle income and/or developing countries (WHO 2015).

Smoking is more prevalent among male students (Ahmed et al. 2008). According to Morin et al. (2012) persistent high achievers in education are less likely to initiate smoking. Additionally, it has been reported that smoking is also related to various other factors including parental control (Morin et al. 2012). Educational achievement has been observed to be related to smoking among students as well as family factors like parental smoking. In a study conducted in Finland, it was observed, that students not addicted to smoking performed better than student who are addicted to smoking. Furthermore, parental smoking habit also had an adverse effect on the scholastic achievements of the students. Apart from this, even academic achievements deteriorated among new smokers (Pennanen 2012).
Usually, physicians are like role models to patients, so their attitude and behavior about smoking pose a major influence on the psychology of the patients regarding tobacco usage. According to Louise (1990), a physician should be a role model in this regard that he or she should not be a tobacco user, because that can have a negative impact on the mindset of a patient who is a smoker already. Furthermore, workplace of health care providers should convey a message for smoking cessation in a direct and indirect way. On the contrary for a couple of decades, numerous tobacco companies practiced advertisement of cigarette use with the help of physicians, in 1920s to the 1940s. They claimed that cigarette smoking has some beneficial health effects on human body like prevention of weight gain by the use of nicotine (Louise 1990).

According to two studies that have been conducted by the Ottawa civil hospital family medicine center, only those smokers who are highly enthusiastic about quitting smoking and have already made three to five attempts are more likely to cease smoking for a year or more than one year. It was also seen in this study that physicians are not so helpful for the patients in smoking cessation practice. However, health care providers should adopt a four step strategy to help their patients in getting rid of smoking addiction which includes:

a) Educating the public about dangers of smoking and passive smoking as well.

b) Provision of awareness regarding smoking and related diseases.

c) Encouraging smokers to quit smoking.

d) Arrangement of group sessions for those smokers, who are already motivated (Rosser 1984).

In a nutshell, it can be concluded that health care providers can play a major role in cessation of smoking trends in their community. Besides physicians, emphasis should also be put on medical students so that they can play their role in smoking cessation programs more efficiently. Studies among medical students are more important since they are expected to undertake and/or provide leadership to such preventive strategies in the near future. Furthermore, active research in the field is solicited in Pakistan to develop goal directed preventive strategies.
2 LITERATURE REVIEW

2.1 Introduction to smoking

Smoking is the inhalation and exhalation of fumes from a substance (of abuse) used in various forms. The different forms or methods of smoking include cigar, cigarettes and pipes etc. (Ygoy, Health community 2010). Smoking accounts for almost 400,000 deaths annually in The United States of America (USA), approximately 100,000 deaths in The United Kingdom (UK) and 4.9 million around the globe. Additionally, smoking accounts for 12-13% of life years lost in the industrialized countries. About 25% of smokers fail to quit smoking die on the average of 20 years earlier as compared to non-smokers and the people who smoke 20 cigarettes in a day have higher incidence of deaths. Additionally, disability adjusted life years (DALY) are lower among smokers as compared to non-smokers (West & Schiffman 2007).

2.2 History of smoking

The practice of smoking can be traced back to as early as 5000 BC. Evidence shows that many ancient civilizations such as Babylonians, Indians and Chinese burnt different things as a part of their religious rituals. In this regard, smoking of tobacco and many other hallucinogenic substances (of abuse) were used as a method to experience spirituality. Various substances were used for the purpose of smoking, ranging from tobacco & cannabis to fish offal and dried snake skin. Such practices dates back at least 2000 years ago. Fumigations and fire offerings were also a part of Ayurveda (ancient Indian medical practice). However, before the advent of modern methods of smoking like cigarettes, smoking was usually practiced using pipes and specific containers with stems of specific lengths called chillums (Manohar 2004).

2.3 Smoking prevalence around the globe

According WHO, in 2012, people of age 15 or above constituted 21% of the total population around the globe. Men smoke five times higher as compared to women, and average smoking rate for male was 36% whereas it was only 7% for the females. Likewise, men in Western Pacific region has higher rate of tobacco usage (48%) whereas highest smoking prevalence among females
is noted in European region which is 19%. Smoking prevalence among the adolescent girls (aged between 13-15 years) covers 8% of all the smokers globally, however this average doesn’t cover the smoking adolescent girls in European and African region due to unattainability of data for comparison. In WHO regions of Americas, this average has been seen on its peak, where 14% of adolescent girls are smokers. From this it can be assessed that smoking rates among adolescent girls are higher in those countries where there are minimal laws against tobacco. On the other hand, smoking rates among boys (aged between 13-15 years) in Eastern Mediterranean region and South-East Asia region are higher as compared to the rest of the world, and their rate of smoking has been recorded at more than 20% (WHO 2016).

### 2.3.1 Smoking in Asia continent

According to Asian Scientist 2012, in Asian continent India and China have the more smokers than the entire population of the countries who come under the European Union. In case of China, smokers exceed to more than 300 million, where in the case of India this number is lesser that is India has 275 million smokers all around the country. A study conducted by the George Institute of Public Health discovered that that 30% of the total world smokers belong to the Asia-Pacific region. Almost 80% of the total smokers around the globe have an origin from low to middle income countries, according to WHO. Smoking prevalence is higher in these countries since smokers who caught the lung cancers have been diagnosed at the later stage and receive less active treatment. Additionally, WHO has concluded that if developing countries carry on their present smoking status at the same rate then the lung disease will climb at an exponential rate in the next 20 years. However, in these countries females smoke less frequently. For example, in China only 4% females are smokers as compared to males, of whom more than 60% are smokers, and the same ratio can be seen in other countries in Asia like Malaysia and Indonesia. However, tobacco companies are now focusing on promotion of smoking among females as well by using different tactics like use of cigarette packaging in the form of lipsticks. In case of Singapore, smoking incidence has inflated by 33 percent between 2004 and 2010 among the age group from 18-29 years. In case of Indonesia, which is country with the population of 240 million, 57 million people are users of tobacco (Asian Scientist 2012).
A cross sectional study was conducted by Dongfeng in 2000-2001 in China to assess the tobacco smoking and exposure to environmental tobacco smoke (ETS). In this particular study, the sample was composed of 15,540 Chinese adults which were aged between 35-74 years. Information was gathered from the participants by taking interviews on their cigarette usage. It was found that like other Asian countries smoking prevalence was much higher among the male participants (60.2%) as compared to women (6.9%). On the other side, there is also the aspect of exposure to ETS and in this sample size 12.1% of men and 51.3% of women reported that they have been exposed to ETS at home. Whereas in the workplace this exposure to tobacco is almost same for the both genders that is 26.7% for men and 26.2% for women. After findings from this specific study it has concluded that there is a high prevalence of ETS exposure and cigarette smoking in China and like other Asian countries, China also has to take some serious steps to stop this increase in cigarette smoking (Dongfeng 2004).

2.3.2 Anti-smoking initiative in South-Asia region

Generally, cigarette smoking is most likely to be adopted at the adolescent stage of life. In this regard, population in the Asian continent specifically in South Asian countries like Pakistan, India, Bangladesh and Nepal is mostly comprised of adolescents and they are more likely to be exposed to smoking and its consequences. However, understanding of smoking status and anti-smoking initiative in such region is very significant in order to scheme an effective intervention for decreasing smoking prevalence. A study conducted by Rao (2014), in which analysis of the national data of Global Youth Tobacco Survey (GYTS) was done. This GYTS was done in India (year 2006), Pakistan (year 2003), Bangladesh (year 2007) and Nepal (year 2007). GYTS is a survey which was conducted in schools and in this survey adolescent students were included which were aged between 13-15 years. In this study, author has examined the association between the different methods of conveying anti-smoking messages to students. This study included total of 19,643 school children. The prevalence of smoking status in these children was 5.4% and this prevalence was higher in male as compared to female students. There were many factors that played their role in the current smoking status of the children, among them most important were absence of school teaching regarding smoking, discussion among the families on the matter of smoking hazards and no exposure to anti-smoking media messages.
This study concluded that the adolescents who are studying in schools of South Asian countries that is Pakistan, India, Bangladesh and Nepal have no exposure to anti-smoking messages by the government, and they are not taught about the hazards of tobacco smoking in the school are more likely to become smokers in the near future. It also has been extracted from his study that discussion among the families regarding health hazards of smoking also have significant importance from abiding such children being future smokers (Rao et al. 2014). Additionally, a study found good acceptance of smoking cessation program among students (Ahmed et al. 2008).

2.3.3 Smoking prevalence and patterns in Pakistan

Like other countries of the world, tobacco smoking is common in Pakistan and an increase has been noted in his trend every year. In fact, tobacco manufacturing in Pakistan is flourishing at the rate of 5% per annum. Furthermore, Pakistani cigarettes have the highest concentration of tar and nicotine in the world when compared to other cigarettes around the globe (Asghar & Jan 1989, Pakistan health education survey 1991).

In Pakistan, tobacco usage is not only done by cigarette smoking, there are also some other local methods available like “Huqqa” and “Beedi”. Beedi is a local way of tobacco smoking in which tobacco is rolled in dry leaves whereas Huqqa is made up of a clay pot, which is called as “Chillum” which contains a layer of tobacco on which burning coals are to be placed. This chillum is connected to a pot which contains a certain amount of water. The two pots pipes are attached from this pot, one pipe is used for smoking and other is used for filtering the smoke through the water. There are number of diseases which are associated with tobacco use (cigarette, beedi, huqqa) including cancers of different viscera like larynx, lungs, bladder, throat and mouth (Alam, 1998).

A study was conducted in Pakistan in 1994 to assess the patterns and prevalence of smoking all around the country. The data for this study was collected with the help of a structured questionnaire regarding smoking in relation to number of variables like age, sex, marital status, education status and also place of residence of participants that is urban or rural was also considered in this study. The number of participants who were approached to take part in this study was 9441, out of which 21.6% were smokers. Out of this percentage of smokers, 36% were males whereas 9% were females. Smoking status is prominently influenced by the place of residence of the participants, as
it has been noticed in this study that in urban areas smoker’s percentage was 20.7% whereas on the contrary in rural areas it was approximately 22%. The study also revealed that, in both urban and rural areas, men dominate women in the use of tobacco. There was also difference of smoking method in both genders, usage of tobacco via beedi was more common in the males (60%), whereas in the opposite gender usage of tobacco with the usage of huqqa was more common (62%).

Age factor also plays a major role in case of smoking, as it has been seen in this study that in urban areas tobacco prevalence rise up to the age of 64 years and after that decline has noticed in this trend, whereas in case of urban females’ continuous increase has seen with age in prevalence of tobacco usage. Illiterate and married individuals, in both genders, were more likely to be smokers as compared to literate and unmarried individuals. This trend of being smokers among illiterates and married individuals were 2-3 times more in males and 2-5 times more in females as compared to the literate and unmarried individuals. The study concluded that smoking trend is more dominant among illiterates and married individuals who live in rural areas as compared to educated, unmarried and urban dwellers in case of Pakistan. Furthermore, this conclusion is applicable to the both genders that is males and females (Alam 1998).

2.3.4 Constituents of cigarettes of Pakistan

Amount of tar, carbon monoxide and nicotine in tobacco smoke varies among the cigarettes depending upon the manufacturer of the product. For instance, in UK, during the period of 1934-1940, the amount of tar, carbon monoxide and nicotine per cigarette varied between 33 mg, 19 mg, and 2 mg. but it was decreased in 1997 to 17 mg, 17 mg, and 1.4 mg. respectively. In addition, in the case of USA, tar and nicotine quantity per single cigarette has been reduced to 13 and 1mg. from 38 mg and 2.7 mg respectively over the period from 1956 to 1979. The maximum amount of nicotine and tar per cigarette is 2 mg and 20 mg respectively which has set through legislation by some counties like UK, USA, and Finland. On the other hand, among 47 brands of cigarettes in Pakistan, amount of nicotine varies from 1.2 to 4.2 mg. per cigarette whereas in case of tar it ranges from 16.3 to 66 mg per cigarette. This indicates that the levels of nicotine and tar are much higher in Pakistani cigarettes as compared to the cigarettes used in other countries. On the whole, out of 47 brands of cigarettes used in Pakistan, 87% had tar and 78.7% nicotine levels beyond the legal international limits for these two contents of cigarette smoke (Asghar & Jan 1989).
2.4 Smoking and gender

2.4.1 Prevalence among genders

In general, males are more prone to tobacco usage than females (Richmond 1999). Globally, smoking prevalence is much higher in men as compare to women. According to WHO 2010, there were 40% smoking males as compared to 9% smoking females, and males comprised 80% of all smokers (WHO 2010). Though, in some cases situation is opposite, like there is 30.3% of smoking prevalence in females as compared to 11.7% of smoking prevalence in males in medical schools of Newcastle upon Tyne has been observed. Likewise, in some medical schools of London same situation has been seen, where smoking prevalence was 24% and 12% in females and males respectively (Ashton & Kamali 1995, Meakin & Lloyd 1996).

In a study conducted by Pirie et al. (2013) to examine the longstanding effects of smoking among 1.3 million of women in UK, the following were the outcomes:

- Women who smoke lost 10 years of life as compared to women who don’t smoke.
- Smoking is accountable for two-thirds of all deaths among women in their old age.
- Irrespective of the age of women, smoking has serious health hazards.
- Stoppage of tobacco use before the age of 40 in women can prevent the 90% of deaths caused by continuing the smoking after the age of 40.

This finding is particularly worthy for those countries who have the smoking prevalence mostly in the early stages of women’s life. They can make certain policies to tackle the smoking prevalence among young women before the age of 40 (Pirie et al. 2013).

However, smoking prevalence in women has increased in some medical schools. For example, in case of Kaunas University of Medicine of Lithuania, over a ten-year period (1995-2004) smoking prevalence among female students has increased at an exponential level, whereas in case of male students no significant change has been seen within same period. (Veryga & Stanikas 2005).
2.4.2 Tobacco control for women

According to Amos and colleagues (2011) and Centers for Disease Control and Prevention (CDC) (2012), smoking prevalence among women will be doubled between the year 2005 to 2025. The use of tobacco and particularly secondhand smoke (SHS) exposure among reproductive age women can result in a number of health related complications including pregnancy related problems like fetal growth restriction and infant death among others. Especially in low and middle income countries women are more exposed to SHS and usage of tobacco by women is also more prevalent. According to global adult tobacco survey 2008-2010, within middle income countries the use of smokeless tobacco is much higher among women. Out of these developing countries, India and Bangladesh are on top with prevalence of 14.9% and 20.1% respectively and SHS exposure is common in all other developing countries included in this survey. Different countries have made strategies to halt the tobacco usage according to their prevalence rate. In high prevalent countries, policies should be more focused on promoting the cessation where as low prevalence countries should make the strategies regarding prevention of smoking initiation. Such strategies regarding smoking cessation and smoking initiation are more helpful to reduce the SHS exposure for reproductive-aged women (Amos et al. 2011, CDC 2012).

According to WHO (2010), female smokers have the same amount of risks for different diseases as their male counterparts. However, women have greater ratio of risk for certain diseases as compared to men. There are about 400 cancer causing constituents which are present in the smoke of cigarettes. Furthermore, smoking women have much higher risk of certain cancers such as cervical, acute myeloid leukemia, pancreas, pharynx and esophagus as compared to those who do not smoke. In addition, the reproductive health of women can also be affected by experiencing infertility and delayed in conception. The infants born of women who smoke during pregnancy are more prone to premature death or stillbirth whilst the mother can also experience breast milk reduction.

Programs and policies related to tobacco and smoking control less often consider women as potential leaders and women cannot fully participate in tobacco control agendas. It reflects the gender discrimination when women are ignored over men in tobacco control programs. In 2004, SHS exposure was considered to cause 600,000 premature deaths per annum, whereas 430,000
adult deaths out of which 64% were women. SHS exposure is a big hazard for the health of women and children especially in countries and cultures where many women don’t have the courage to demand smoke free areas even in their residencies. On the whole, second hand tobacco smoke contributes to 1% of total global diseases. To prevent this major problem, children and women should be considered a priority by establishing smoke free areas in public places and homes as well to restrict SHS exposure. Smoking cessation programs should be included for fathers and other smoking male members of the family as a part of reproductive health services (WHO 2010).

2.5 Parental smoking and socioeconomic condition

According to a study conducted by Soteriades and DiFranza (2003) in Massachusetts, the risks regarding smoking among adolescents increased up to 28% with each step down in the education of parents. Likewise, the risk of adolescent smoking shot up to 30% with each step down in the income of parents.

In general, smoking status of parents is the intermediary of these both associations. Similarly, smoke free areas and smoking restriction in households and workplace has a great influence on the current smoking status of a person. Frakas et al. (1999) reported that smokers who reside in smoke free areas are more likely to quit smoking. Overall, both workplace and household restriction on smoking resulted in high proportion of cessation attempts, low rate of relapse among the smokers who attempted to quit and high rates of light smoking among the regular users of tobacco.

2.6 Health habits of medical students

Health habits, attitudes and general hygiene practices effect the life of individuals. However, among medical students, health behaviors and hygiene practices have a bigger impact on their academic performances and future professional prospects. It relates to their emotional adjustments for future function as physicians (Ball & Amy 2002).

In 2002 Ball & Amy reported that, first-year medical students show significant changes in their habits as a part of their social and emotional adjustments at the medical schools. While studying in medical schools, various other changes in habits also occur. These changes in habits include
reduced sleep and exercise, increased socialization with specific groups/peers and various addictions. These changes can be attributed to acute and/or long term stressors. Proper health education and self-care programs are needed to promote healthy living among medical students. Both long-term and acute stress are common among medical students. Studies have shown that medical students face high level of stress during first year at medical schools. Chronic stress is common among senior medical students and medical residents. Changes in life styles and stress contribute to taking up new addictions and unhealthy life style practices. Health education practices have shown good results in reducing addiction and adopting better life styles among medical students (Mitchell et al. 1983, Ball & Amy 2002).

2.7 Smoking among medical students

2.7.1 Prevalence around the globe

Present knowledge states that the habit of tobacco smoking is usually taken up during adolescence and early adulthood. Additionally, some researchers suggested a link of various psychological pathologies with smoking. Peer pressure and an image of high status lifestyle models also encourage smoking. Since teenagers and early adults (university students) are more influenced by peers and life style models, they are more prone towards smoking (Stanton & Silva 1992, Paton et al. 1996, Harris 1999).

Medical students are expected to have better health knowledge compared to general population. They are also expected to have better hygiene and life style practices. However, substance abuse and addiction remains a problem among medical students. Prevalence of tobacco usage is a variable factor and this prevalence varies in different countries and in genders also. According to a study conducted in 42 countries and with a total of 51 medical schools, 2-48% of male students’ smoke, whereas in the case of females the ratio is 0-22%. The highest prevalence of tobacco usage among males occurs in medical schools of Russia (61%) whereas in case of females the ratio is highest within medical schools of Barcelona, Spain (Rodriguez & Cami 1984, Tessier et al. 1993, Richmond 1999).

Tobacco usage has a major difference in every continent and country all around the world. For example, in case of nine Asian countries, smoking prevalence in males and females is 22-35% and
2-5% respectively in fifteen medical colleges as a whole. Likewise, in Africa, prevalence of smoking is 29% for males and 10% for females. However, a major difference has been noted in case of Middle Eastern medical colleges, where smoking prevalence is 28% in males and 2% in females (Hamadeh 1994, Tessier at al. 1992). In Medical schools of Wales, Scotland have the least prevalence of smoking among female students that is 10% compared to the highest prevalence of 45% in the medical schools of Barcelona, Spain. Whilst in case of opposite gender that is males, highest prevalence (61%) has been noted in the medical schools of Moscow, Russia and minimum practice of smoking (12%) has been observed in the medical schools of Newcastle upon Tyne (Rodriguez & Cami 1986, Tessier at al. 1993, Ghodse & Howse 1994, Ashton & Kamali 1995).

Some studies have shown that preventive measures have positive effects on the abstinence rate (Flaherty & Richman 1993). A cross-sectional study among two medical colleges in Riyadh, Kingdom of Saudi Arabia showed that nearly 1/4th of the students continued to smoke despite good knowledge about its hazards. In the same study more than 90% of the students stated that they would advise their patients to quit smoking. Additionally, 88% expressed their views against public smoking (Al-Haqvi et al. 2010). Earlier studies in the Netherlands have shown that more than 25% of medical students’ smoke. Smoking habits of physicians were similar to that of general population. Additionally, approximately 3/4th of the study population (medical students and doctors) never experienced any health education or self-care programs on smoking cessation (Waalkens et al. 1992). According to Almerie et al. (2008), tobacco smoking rate was alarming among Syrian medical students. Substance use was reported between 30 to 80 percent of Indian medical student interns (trainee doctors) and residents (Kumar & Basu 2000). Based on these studies smoking seems to be a common practice among medical students that requires special attention.

2.7.2 Variations in smoking trends in medical school

During medical school education, students are considered to be more cautious and logical about the hazards of smoking. But opposite situation has been noticed in this case, as medical students are more likely to become smokers during their medical studies and an increase in the consumption of tobacco has noticed for the students who are already smokers. Knowledge about the hazards of smoking has no influence on the smoking habits of the medical students. Furthermore, medical
students even during their training are more likely to become tobacco users and an increase has noticed in this usage instead of a decline. It is believed that smoking trend in medical institutions can be prevented by providing knowledge about the hazards and health risks of smoking in the early professional years of medical school rather than later in the clinical stage of medical course. (Knopf & Wakefield 1974) In China, smoking prevalence in the first professional year of medical course is 27.1% which rose up to 49.4% in the final professional year of medical school. It can be noticed that medical studies have minor effects on the smoking trend among medical students. Other than this, there is no difference regarding smoking prevalence in medical and non-medical students. One more thing that is also common in these two categories of students is that tobacco consumption is increased with age and with the years of study as well. However, medical college students are different from non-medical college students as they are more likely to become occasional smokers (Zhu et al. 2004). According to Hamadeh (1994), in Bahrain there were no smokers in the first year of medical course but in the final year prevalence was 45.5%.

According to Tessier at al. (1989), smoking prevalence among first year medical students was 13.7% whereas in case of students of final medical professional year it was 21.2% in fourteen European nations. The difference in occasional smokers has also noted in case of first year and final year students that is a proportion of occasional smokers in first year was 15.9% which rose to 17.2% in the final year students. The same inclination in smoking prevalence has seen in another study conducted in medical schools of 10 African and Middle Eastern countries by Tessier et al. 1992. In Africa, smoking prevalence was 19% for first year students while it was 27% for final year students. This smoking prevalence was not only high in medical schools of European, African and Middle East countries, even 15 medical schools in 9 Asian countries showed the same tendencies of smoking prevalence. It was 4% in first year students while 11% for final year students in Asian countries (Tessier et al. 1992a, b). Another cohort study conducted in Akdeniz University of Turkey concluded that students of first 3 years of medical course are more likely to become smokers. However, there are some factors which can increase the chances of a student being a smoker like having friends who smoke in the same group, presence of anxiety among students and being a male. In this study, only 21.8% of students smoked at the time of registration but at the end of six years of medical course it was noticed that male students smoked for time period of 2.6-3 years whereas females smoked for 1-1.8 years on the whole. Whereas out of 93 medical students who were non-smokers at the time of registration 30 medical students became
smokers at the end of medical course (Senol et al. 2006). It can be said that students of medical school become used to smoking even from the initial years of their medical course, so it is more appropriate that education regarding health hazards of tobacco usage should be carried out thoroughly from first year to final year to standstill this smoking prevalence (Richmond 1999). According to Kawakami (2000), merely 8% of students in a Japanese medical school have knowledge about hazardous effects of smoking while in case of final year students this ratio was 42.1% which shows a major difference. Thus, steps need to be taken right from the initial years of the medical course to tackle this growing problem of smoking.

2.8 Smoking and medical professionals

Smoking among medical doctors is an important issue in public health sector. Besides of this, tobacco usage is a perilous international issue in public health sector for public health policy makers. WHO categorizes smoking as the second major cause of death and fourth utmost health hazard for many diseases all around the world. If this smoking trend is not stopped by 2020 then it can result into 650 million deaths overall (Smith & Leggat 2007).

Physicians and other medical professionals play an active role in society to stop tobacco usage and in the establishment of public health policies, so that is why smoking among physicians and medical professionals is a major issue to be discussed (CDC 1993). As physicians are the first personnel to whom patients contact regarding their problems and researches have also shown that medical interventions can help the smoking patients to get rid of their smoking addiction (Fowler 1993). In this regard, medical professionals are being considered as a role models for the community, patients and other colleagues who work and practice with them in the same workplace. So physician’s workplace environment should be totally smoke free (Nett 1990). It has also been suggested that physicians are the only one who can convince their patients to quit smoking if they are non-smokers (Garfinkel 2008). Furthermore, physicians who are smokers have some problems in encouraging the healthy environment among their patients. If physicians are smokers in a work place, they must be assisted in quitting their smoking and other medical students should be prevented from adopting this habit (Samuels 1997). Programs related to smoking cessation should be familiarized among the physicians and physicians should be motivated about their roles in community regarding smoking cessation (Ohida et al. 2001).
According to the International Labor Organization (ILO), smoke free work place should be promoted as this is one of the main steps for healthy and safe work environment. Tobacco usage is a very serious occupational issue among the medical professionals. According to a review including 81 studies over 30 years (1974-2004) regarding tobacco smoking, tobacco usage varies all around the world among medical professionals, in fact this trend is not uniformly low. In a nutshell, smoking prevalence should be decreased in the near future among physicians, so that physicians can play their role efficiently in anti-smoking campaigns and cessation programs (Smith & Leggat 2007).

2.9 Comparison of smoking prevalence among medical Students, general Population and medical professionals

Generally, smoking prevalence among medical student is considered to be lower as compared to the general population of same age. For example, in case of Denmark smoking prevalence is 22% among medical students as compared to 40% smoking prevalence in the general population. Likewise, UK has same trend where in thirteen medical schools smoking prevalence is 11% as compared to 33% smoking prevalence in the general population. On the contrary, in some studies medical and non-medical students have no significant difference regarding tobacco usage. For instance, among 12 universities of China no substantial difference has noted in these two categories of students. The only variance that has noted among medical and non-medical students of same age is that medical students are more likely to become occasional smokers rather than regular users of tobacco. A similar trend has also been observed among medical students of Tuscany, Italy where smoking prevalence among male medical students is 40% as compared to 28% smoking prevalence in general population. Again, female medical students have smoking prevalence of 25% as compared to 13% among females of the general population. Although there is low smoking prevalence among females, there are more occasional smokers among female medical students than non-medical students of same age (Richmond 1999, Melani et al. 2000, Zhu et al. 2004). It has also observed that proportion of infrequent smokers tend to ascend with the educational level. So it can be concluded that being a medical student or a physician has no effect on the choice of being a smoker, however medical education can modify the consumption level of tobacco (Gliptin et al. 1997).
On the other hand, comparison of smoking prevalence among medical students and doctors has revealed that physicians smoke more frequently as compared to medical students. For example, according to Hamadeh (1994), in Bahrain 60.1% of the male physicians smoke as compared to 27.5% of male medical students and 2.3% of the female students. The same prevalence of smoking has been seen in Netherlands, where 37% of the male physicians smoke as compared to 31% of male medical students. In both cases, medical physicians have higher prevalence than medical students in tobacco usage (Waalkens at al. 1992, Hamadeh 1994).

2.10 Medical students’ knowledge regarding smoking and its effects

A survey was conducted globally in 42 countries to assess the knowledge, attitudes and behavior of medical students regarding usage of tobacco. 51 medical schools participated in this survey covering 9,326 medical students, out of which 44% were women. The results of this survey revealed that medical students do not have adequate knowledge about the role of smoking in different diseases. Additionally, many diseases which are mainly linked with smoking like coronary heart disease, peripheral vascular disease, emphysema, and bladder cancer were ignored by the medical students. A small proportion of medical students were aware that taxation on tobacco may result in the reduction of its consumption level. Students did not know that being a doctor in future, how they can reassure their patients to quit smoking (Crofton et. al 1994). Similarly, when 1,392 medical students of Shanghai Medical University in China were assessed for their knowledge and attitude towards smoking and anti-smoking campaigns, the results indicated that there were lot of shortcomings in knowledge of medical students regarding smoking usage and its association with related diseases. Besides, it has also been reported that students do not have proper knowledge regarding their role of being medical professionals in anti-smoking campaigns (Lei et al. 1997).

According to a worldwide survey carried out in 143 countries including 1,353 participating medical schools, only 11% of the medical schools teach about tobacco as a detailed unit of medical curriculum, whereas 58% of medical schools teach about tobacco as a part of other subjects included in the medical syllabus. Additionally, subject of tobacco is not part of the medical curriculum in 12% of the medical schools that participated in the survey. (Richmond et al. 1998). For instance, in Italy, none of the medical schools has a curriculum that has a specific topic related
to tobacco use (Quaranta & Bilancia 1994). In case of medical professionals, especially young physicians only 21% thought that their medical education, which they acquired as a medical student, is enough to deal with every type of condition and every type of patients as well. However, on the whole young physicians thought that there are some flaws and deficiencies in their medical training system which should be overcome (Canon et al. 1993). One of the main reasons of this issue is the lack of motivation among staff members of medical schools in motivating their students. Among other things, the study concluded that, reasons like glitches in the administration department and lack of mutual cooperation among different departments of medicine to modify the medical curriculum can be involved (Richmond et al. 1998).

In medical schools, when students are in their learning stage this is best time in which they can be familiarized with education regarding tobacco usage and its health risks (Cummings at al. 1989). According to Ferry et al. (1999), tobacco usage is the preventable foremost cause of deaths in USA. Only 21% of the physicians in USA think that they are fully trained to counsel their patients to quit smoking. A survey was conducted in 126 medical schools in USA to evaluate the knowledge medical professionals about smoking cessation. At the end of this survey it was revealed that most of the medical graduates are not fully trained to help patients regarding tobacco cessation. The reason underlying this deficit is the lack of smoking cessation instructions in their clinical years of medical training. Similarly, in Europe only 27.3% of the final year students of medical schools consider themselves fully trained and skilled to guide patients about quitting the tobacco usage. This proportion of medical students is almost same in Asia which is 29% and 45% in Africa by final year medical students (Richmond 1999). It is very essential that medical students should be fully trained to deal with their patients who are willing to quit smoking as they are the first line in the medical profession to whom patients interact (Moxham 2000).

In connection to smoking cessation, a study was conducted in 24 medical schools of UK to assess whether newly qualified medical doctors have full knowledge regarding smoking cessation techniques or not. It was revealed that 60% of the participants have no knowledge regarding national guidelines for smoking cessation whereas training in this regard was almost ignored. However, 17% of house officers thought that they can counsel patients regarding nicotine replacement therapy and only a very small proportion of the house officers (5%) had knowledge of the role of Bupropion in smoking cessation practice. On the whole, inadequacy has been found
regarding teachings on smoking cessation in medical schools of UK (Roddy et al. 2004). According to Barengo et al. (2004), occasional smoking among Finnish physicians working in teaching or research department is 18%. This ratio of occasional smokers among physicians can definitely convey a negative message to their medical students to whom they teach. Furthermore, their tobacco usage may act as a hindrance in conveying smoking cessation education to medical students. According to a study conducted by Richmond (1999), majority of final year medical students consider that they do not have enough knowledge and techniques for convincing a patient to give up smoking. Whilst others stated that they will counsel the patient to abandon smoking provided that the discussion is initiated by the patient itself. Furthermore, knowledge of medical students regarding smoking cessation varies from country to country like in Asia only 29% of medical students had sufficient knowledge concerning smoking cessation counselling of patients compared to medical students in Europe (27%) and Russia (16%).

In a study done in Kuopio University medical school regarding knowledge of students about smoking and tobacco control policies, it was reported that students’ involvement in policies and programs related to reduction of smoking is not enough. Moreover, occasional smoking is a common problem among medical students especially male medical students. Additionally, students’ future intentions to deal with the smokers as a physician are not adequate. So these points and shortcomings should be considered well when constructing tobacco control policies and programs for medical students during their training (Toriola 2007).

2.11 Attitude of medical students regarding smoking and patient counselling in future

In a study conducted among first and final professional year of New South Wales of Sydney to evaluate the attitude and smoking habits of Australian medical students, Richman and Kehoe (1997), reported that knowledge and awareness about the association of tobacco and related diseases is necessary for undergraduate medical students. Students should also receive training on how to deal with patients who are used to tobacco smoking. The study, showed that smoking prevalence among both males and females is same in the case of first professional year, but changes dramatically among fifth professional year in which males were more likely to be daily or occasional smokers as compared to the students of first professional year. However, 39% of the present smokers of this study revealed that they already made serious attempts to quit their
smoking. When all the participating students were asked about their smoking status in the next five years, 90% of them thought they will certainly be non-smokers in that time; 64% occasional and daily smokers thought that they will plan to quit their smoking status. Only 8% of the students assumed that they will still continue to smoke at that time.

With regards to counselling the patients about smoking cessation as a doctor in the future, almost all students mentioned that they will counsel their smoking patients if they have any smoking related diseases. Whereas only 50% of the medical students of fifth year and 25% of the first year students said being a health professional they will advise their patients to quit smoking even if they have no symptoms or they have not raised that issue on their own. It has shown that they have improper knowledge and attitude regarding the role and responsibilities of doctors which a doctor should have in his or her interaction with smoking patients. Students of fifth year medical students who smoke already are more open to interact with the patients about smoking. May be the reason of this was their own smoking habit or the experiences they faced while being a smoker. Nevertheless, with regards to reticence of medical students to counsel smoking patients who have no sign or symptoms of smoking related diseases, majority of the students had an opinion that when they will be promoted to fifth year, they will have the sufficient knowledge to counsel the patients about their smoking habits. Regarding regulation of tobacco usage, most students were concerned about cautionary warning on the cigarette packages and prohibition on the cigarette advertisements, but students who smoke were less congenial on the price increases of cigarettes (Richmond & Kehoe 1997).

In a related study from College of Medicine of University of Lagos, Nigeria it was concluded that, although the current usage of tobacco was relatively low among the medical students in that region, but participants’ level of knowledge was not sufficient regarding risks and complications associated with cigarette smoking. Furthermore, being a medical professional, attitude and behavior of medical students regarding offering of smoking cessation advice to their smoking patients had some gaps. Therefore, a proper training should be included at a very early stage of the medical professional studies to tackle these problems (Dania et al. 2015). Most of the current smoking medical students think that all health professionals including themselves should get some training to cease smoking. Additionally, medical doctors should not use tobacco as they are role models for the society in which they work (Khan et al. 2005).
2.12 Anti-Smoking program for medical students

Cessation programs about smoking and health education can help to tackle the current situation. Various studies have suggested the need for targeted anti-smoking training, self-care program and health education. It can also be stated that in majority of the cases, medical students as well as physicians are never exposed to any kind of smoking cessation programs. A study can help to formulate targeted campaign, health education and/or self-care program for medical students (Xiang et al. 1999, Haddad & Malak 2002, Vakeflliu et al. 2002).

2.13 Importance of the study

Health research forms a major field of academic studies; this helps the researcher not only to understand the extent of health event but also specific causes resulting in them. The results in turn are useful for formulation or validation of health reforms. However, the important limitation with this kind of studies are that they cannot be generalized in other population other than the one studied. Nevertheless, these kind of studies in health research can help to explore the health events under consideration (Bogdan & Taylor 1987).

Research on tobacco abuse (smoking) has revealed the importance of primary prevention (Koerbar et al. 2012). Hence, the results of such studies can be used to formulate preventive measures for smoking among medical students.
3 AIMS OF THE STUDY

3.1 General Aims

The main aim of the study was to assess and evaluate the knowledge, attitude and practice regarding smoking among medical students in Pakistan.

3.2 Specific Aims

The specific aims of this study were as follows:

- To evaluate the knowledge of medical students regarding different diseases specifically associated with tobacco usage.
- To find out the smoking prevalence among medical students and different methods used for this purpose.
- To compare the knowledge, attitude and practice regarding smoking among medical students of different academic years.
- To assess the participation of medical students in anti-smoking campaigns and activities.
4 MATERIALS AND METHODS

4.1 Study design

For this study, a cross-sectional questionnaire survey was conducted at Khawaja Muhammad Safdar Medical (KMSMC) of Sialkot city of Pakistan in December, 2015.

4.2 Study setting

The study took place at KMSMC, located in Sialkot city of Punjab province of Pakistan. Sialkot city is the 12th most populous city of Pakistan having population of about 2.7 million and area of 3016 square kilometers (PBS 2014). Figure 1 shows the 35 districts of Punjab province of Pakistan including Sialkot city (Javed 2011).

*Figure 1 Map of Punjab province of Pakistan with its districts (Javed 2011)*
KMSMC was established in 2008 and it is a public sector medical college situated in Sialkot city of Pakistan. This medical college is affiliated with Pakistan Medical and Dental Council (PMDC) which is a regulatory authority for the practitioners and students of medicine and dentistry in Pakistan. This is a teaching institute conferring five years under graduate program: Bachelor of Medicine, Bachelor of Surgery (MBBS). This medical college is affiliated with two hospitals, namely, Allama Iqbal Memorial Hospital and Sardar Begum Memorial Hospital (KMSMC 2015).

4.3 Study subjects

KMSMC has approximately 500 enrolled medical students, studying in different professional years of MBBS degree, ranging from 1st professional year to 5th (final) professional year. Almost, in each professional year one hundred students are studying, making total of regular 500 students of this medical college. All the medical students were approached to participate in this study and were designated as study population. However, participation in this study by the candidates were totally based on their willingness to participate.

4.4 Data collection

A 36-items questionnaire divided into 4 major sections written in English language was used in this study. Both open and close ended questions were included in questionnaire. The first section contained the questions related to demographic data (Gender, age, marital status etc.) of the participants. Second section of the questionnaire which contained 6 questions in total was about the knowledge of students regarding effects of smoking on health. In this section, participants were required to answer questions by writing in the blank spaces provided instead of provision of limited choices. Furthermore, question regarding legal age of smoking, methods of smoking and different substances used for smoking in their community were included in this section to assess the thorough knowledge of participants in these aspects. Third section was about the general attitude of participants regarding smoking and it contained 11 questions. In this section, mostly question was answerable by choosing the options among, “disagree, undecided or agree” option. This section contained questions like effect of smoking status of physicians on their patients and relationship of medical education on smoking prevalence among medical professionals. Third and last section contained 13 questions about the practicing of smoking among medical students and
family members as well. Mostly questions in this question were of multiple choice questions type in which participant has to choose one or more than one option. Questions regarding smoking status of their family members were included in this section so that the correlation of family member’s smoking status and smoking status of participants could be assessed.

The survey was conducted in December, 2015 through distribution of the questionnaire among medical students. However, before conducting the actual survey piloting of the questionnaire was done to assess the feasibility and applicability of the questionnaire. After piloting, minor changes were done in the questionnaire and then it was distributed to medical students studying in different professional years of medical college. The questionnaire was administered to participants in their class rooms in order to get maximum response rate. Sufficient time was allotted to fill in the questionnaire. If the participation rate was low in any class, a second visit was done to cover those students who were absent in the first session. Finally, questionnaire was collected from all the participants and the information contained in these questionnaires were saved. Out of 500 medical students in this medical school, 306 students participated in this study, provided a response rate of 61.2% on the whole.

4.5 Data analysis

- Data was analyzed by using Statistical Package for the Social Sciences (SPSS) version 23.
- Descriptive statistics were accomplished for the participant’s knowledge, attitude and practice regarding smoking.
- Chi-square test and Fisher’s exact test were used for categorical variables.

4.6 Ethical considerations

Proposal for the study was approved by the Institute of Public Health and Clinical Nutrition, University of Eastern Finland. In addition, permission was sought from the administration department of KMSMC to conduct the data collection for this particular study. Furthermore, an informed verbal consent was also taken from students before distribution of questionnaire to them; and participation by the participants was totally voluntary. Participants were guaranteed that information provided will be kept confidential and solely be used for this study.
5 RESULTS

5.1 Demographic characteristics of study sample

There were about 500 medical students studying at KMSMC in five professional years MBBS degree. Out of this 500 students 306 medical students had participated in filling the questionnaire of this particular study. Out of 306 participants of this study, female students were 227 making the major portion (74.2%) of the participating candidates whereas male students were 79 making 25.8% portion of the total participants. Highest response was seen from the 1st year students (23.2%) whereas lowest participation was noted by the 4th year medical students (17.6%). Average age of the participants was 20.48(±1.72) years, and 81.4% of the participants were from urban areas and 18.6% from the rural areas.

Table 1 is representing the detailed demographic and social characteristics of the medical students who took part in this study.
Table 1 Demographic and social backgrounds of medical students (N= 306)

<table>
<thead>
<tr>
<th>Characteristics of the respondents</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>79</td>
<td>25.8</td>
</tr>
<tr>
<td>Female</td>
<td>227</td>
<td>74.2</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-25</td>
<td>306</td>
<td>100</td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>20.48 (±1.72)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>5</td>
<td>1.6</td>
</tr>
<tr>
<td>Unmarried</td>
<td>301</td>
<td>98.4</td>
</tr>
<tr>
<td>Place of Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>249</td>
<td>81.4</td>
</tr>
<tr>
<td>Rural</td>
<td>57</td>
<td>18.6</td>
</tr>
<tr>
<td>Monthly Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10,000 PKR.</td>
<td>4</td>
<td>1.3</td>
</tr>
<tr>
<td>10,000 – 29,000 PKR.</td>
<td>38</td>
<td>12.4</td>
</tr>
<tr>
<td>30,000 – 49,000 PKR.</td>
<td>69</td>
<td>22.5</td>
</tr>
<tr>
<td>50,000 or more PKR.</td>
<td>195</td>
<td>63.7</td>
</tr>
<tr>
<td>Professional year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Year</td>
<td>71</td>
<td>23.2</td>
</tr>
<tr>
<td>2nd Year</td>
<td>58</td>
<td>19.0</td>
</tr>
<tr>
<td>3rd Year</td>
<td>63</td>
<td>20.6</td>
</tr>
<tr>
<td>4th Year</td>
<td>54</td>
<td>17.6</td>
</tr>
<tr>
<td>5th Year</td>
<td>60</td>
<td>19.6</td>
</tr>
</tbody>
</table>

1 Pakistani rupee
5.2 Knowledge of medical students regarding legal age of smoking

The legal age for smoking in Pakistan is 18 years or above, whereas out of 306 medical students only 143 (46.7%) medical students knew that this age is legal for smoking in the country and 167 (53.3%) students of this study sample had no knowledge regarding this point. It was noted that students of 1st professional year were more aware of this knowledge and then this trend decreased as the professional years increased. On the whole, half of the medical student did not have sufficient knowledge regarding the usage of smoking among their community with respect to the legal age of smoking.

Table 2 Knowledge of medical students regarding legal age of smoking in Pakistan

<table>
<thead>
<tr>
<th>Medical Professional year (Total no. of students)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year (71)</td>
<td>37 (52.1)</td>
</tr>
<tr>
<td>2nd Year (58)</td>
<td>28 (48.3)</td>
</tr>
<tr>
<td>3rd Year (63)</td>
<td>26 (41.3)</td>
</tr>
<tr>
<td>4th Year (54)</td>
<td>26 (48.1)</td>
</tr>
<tr>
<td>5th Year (60)</td>
<td>26 (43.3)</td>
</tr>
</tbody>
</table>

5.3 Medical students’ response regarding smoking effects on health

Generally, all the medical students (98.4%) participated in this study were well aware about the harmful effects of smoking irrespective of their medical professional year. However only 4 students (1.3%) out of 306 medical students took the effects of the smoking in a positive way that smoking is beneficial during the examination period, as nicotine stimulates the nervous system and improves the cognitive ability.
5.4 Knowledge of medical students regarding association of smoking with various diseases

Medical students had thorough knowledge of the major diseases which are directly or indirectly associated with smoking. Knowledge of medical students of final professional year was much improved and developed as compared to the students of following professional years. For example, in case of cardiovascular disease (CVD), 81% of the medical students had knowledge whereas this figure was very low in case of 1st year (46.5%) and 3rd year students (15.9%). Similar trend was seen in case of knowledge about chronic obstructive pulmonary disease (COPD) whereas final year students (98.3%) had more extensive awareness as compared to the 2nd year (69%) and 4th year students (68.5%). However, an inverse trend was noticed in case of asthma in which knowledge about this complication is declining as the students are getting nearer to completion of studies. All the students in each professional year had thorough knowledge of lung cancer being associated with the use of tobacco. Almost half of the students present in each professional year knew about the association of smoking with oral cancer.

Table 3 Knowledge of medical students regarding association of smoking with different diseases

<table>
<thead>
<tr>
<th>Professional year (Total no. of students)</th>
<th>Lung cancer N (%)</th>
<th>COPD² N (%)</th>
<th>CVD³ N (%)</th>
<th>Oral cancer N (%)</th>
<th>Asthma N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year (71)</td>
<td>67 (94)</td>
<td>58 (81.7)</td>
<td>33 (46.5)</td>
<td>28 (39.4)</td>
<td>23 (32.4)</td>
</tr>
<tr>
<td>2nd Year (58)</td>
<td>51 (87.9)</td>
<td>40 (69)</td>
<td>23 (39.7)</td>
<td>25 (43.1)</td>
<td>22 (37.9)</td>
</tr>
<tr>
<td>3rd Year (63)</td>
<td>57 (90.5)</td>
<td>53 (84.1)</td>
<td>10 (15.9)</td>
<td>33 (52.4)</td>
<td>24 (38.1)</td>
</tr>
<tr>
<td>4th Year (54)</td>
<td>53 (98.1)</td>
<td>37 (68.5)</td>
<td>43 (79.6)</td>
<td>31 (57.4)</td>
<td>13 (24.1)</td>
</tr>
<tr>
<td>5th Year (60)</td>
<td>58 (96.7)</td>
<td>59 (98.3)</td>
<td>49 (81.7)</td>
<td>32 (53.3)</td>
<td>15 (25)</td>
</tr>
</tbody>
</table>

² Chronic obstructive pulmonary disease
³ Cardiovascular disease
Figure 2 shows overall knowledge of 306 medical students about different diseases and complications which are associated with smoking. From the chart, it is obvious that lung cancer and COPD were the most common complications about which medical students knew very well irrespective of their study year in which they were. However, more than 30% students attributed asthma with smoking and approximately 50% medical students thought that smoking is the reason for oral cancer and CVD as well.

![Knowledge of medical students regarding major diseases caused by smoking](image)

*Figure 2 Knowledge of medical students regarding association of smoking with major diseases*
Table 4 depicts the familiarization of 306 medical students regarding a number of diseases and malignancies which are linked with usage of tobacco. From the table it is clear that, lung malignancies and other pulmonary diseases (bronchitis, emphysema, COPD etc.) were the most common complication about which students knew their association with the smoking in a well manner. In this regard, 242 students (79.1%) were acquainted with the bronchitis, emphysema, COPD etc. and 218 students (71.2%) knew that lung malignancies were directly related with smoking. However, a very few number of students (2.9%) had knowledge regarding link of lung malignancies with the smoking. On the contrary, malignancies which are apart from lungs and including other organs like breast, urinary bladder etc. were the least complications about which students had knowledge about it. Approximately 50% of the students were well aware about relation of such malignancies with the smokers. Likewise, long term complications like hypertension and hypercholesterolemia which are the results of regular smoking were well acquainted among the medical students (68.3%).

<table>
<thead>
<tr>
<th>Smoking related complications</th>
<th>Unfamiliar N (%)</th>
<th>Some knowledge N (%)</th>
<th>Familiar N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung malignancies</td>
<td>9 (2.9)</td>
<td>79 (25.8)</td>
<td>218 (71.2)</td>
</tr>
<tr>
<td>Other pulmonary diseases (Bronchitis, emphysema, COPD etc.)</td>
<td>4 (1.3)</td>
<td>60 (19.6)</td>
<td>242 (79.1)</td>
</tr>
<tr>
<td>Malignancies apart from lungs (Breast, urinary bladder etc.)</td>
<td>102 (33.3)</td>
<td>90 (29.4)</td>
<td>114 (37.3)</td>
</tr>
<tr>
<td>Chronic adverse health effects (Hypertension, hypercholesterolemia)</td>
<td>18 (5.9)</td>
<td>79 (25.8)</td>
<td>209 (68.3)</td>
</tr>
</tbody>
</table>
5.5 Common methods of smoking in Pakistan

Figure 3 shows the bar chart illustrating the methods of smoking which were more common in Pakistan. It can be seen that cigarette was on the peak among the most common ways of using tobacco in the community. Whereas there is only slightly difference regarding usage of cigar and sheesha in the region, although there is upward trend was seen in case of tobacco usage via sheesha. The least ways of consuming tobacco are associated with the usage of beedi, though it is quite an old method which is used to inhale the tobacco smoke. On the whole cigarette usage has lead other methods in Pakistan as it is the most economical way to devour tobacco.

![Common methods of smoking in Pakistan](image)

*Figure 3 Most common methods of smoking in Pakistan*
5.6 Knowledge of substances other than tobacco used for smoking

Figure 4 illustrates that consumption of heroin and marijuana in Pakistan. Although, tobacco usage is on the top of consuming list by the community, but besides of tobacco other substances like heroin and marijuana are in common practice to be used by the addicts. As it can be observed that usage of both substances is almost equal only with a difference of 1%, marijuana consumption (44.80%) is however leading over the heroin consumption (43.80%).

![Usage of heroin and marijuana in Pakistan](image)

Figure 4 Usage of heroin and marijuana in Pakistan

5.7 Knowledge of medical students regarding electronic cigarette

Usage of electronic cigarette is not as common in Pakistan as it is a contemporary way of consuming tobacco and this is the reason that medical students of Pakistan had not much cognizance about such practice of tobacco smoke inhalation. Out of 306 medical students, only 68 participants (22.5%) had ever heard about electronic cigarette whereas remaining never heard about its usage among the smokers.
5.8 Anti-smoking campaigns and medical students

There was very less proportion of medical students who had participated in some sort of anti-smoking campaign to play their role as medical professionals to tackle the problem of smoking in their community. Out of 306 medical students, only 34 (11.11%) medical students had attended anti-smoking campaign in their career. Maximum participation was noticed by the medical students of first and second professional year when they were compared to the fourth and fifth professional years.

Table 5 Participation of medical students in anti-smoking campaign

<table>
<thead>
<tr>
<th>Medical professional year (Total no. of students)</th>
<th>Participation in anti-smoking campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Year (71)</td>
<td>10 (14.1)</td>
</tr>
<tr>
<td>2nd Year (58)</td>
<td>10 (17.2)</td>
</tr>
<tr>
<td>3rd year (63)</td>
<td>2 (3.2)</td>
</tr>
<tr>
<td>4th Year (54)</td>
<td>6 (11.1)</td>
</tr>
<tr>
<td>5th Year (60)</td>
<td>6 (10.0)</td>
</tr>
</tbody>
</table>

5.9 General attitude of medical students regarding smoking

Table 6 represents the general attitude of medical students regarding smoking usage and influence of friends and family members who smoke, on themselves. Almost 80% students thought that there is a solid inspiration of smoking on the non-smoker members of a family if a family member smoke. Chances of becoming a smoker for a non-smoker are increased up to more than 10 folds if a person has smoking friends as compared to smoking family members. Similarly, 245 students (80.1%) out of 306 had same thought in this regard that if someone smokes in a community it can disturb his or her relation with the others. Also, only 23.5% students considered that they can be open to their guardians regarding their tobacco usage as compare to 59.5% students who preferred to be quiet about their tobacco usage. Moreover, smoking status can affect smoker’s relation with someone fellows or friends and this is the reason that 265 students (86.6%) also had the same opinion. Likewise, in the opinion of 289 (94.4%) medical students if they smoke, it will not inspire the others to smoke, as smoking is based on person’s own discretion usually.
Table 6 General attitude of medical students regarding smoking

<table>
<thead>
<tr>
<th>Questions type</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think people are influenced by their family members who are smokers?</td>
<td>44 (14.4)</td>
<td>19 (6.2)</td>
<td>243 (79.4)</td>
</tr>
<tr>
<td>Do you think people are influenced by their friends who are smokers?</td>
<td>13 (4.2)</td>
<td>7 (2.3)</td>
<td>286 (93.5)</td>
</tr>
<tr>
<td>Do you think your smoking status affects your relations with the others?</td>
<td>39 (12.7)</td>
<td>22 (7.2)</td>
<td>245 (80.1)</td>
</tr>
<tr>
<td>Would you like to be open to your parents about your smoking status?</td>
<td>182 (59.5)</td>
<td>52 (17.0)</td>
<td>72 (23.5)</td>
</tr>
<tr>
<td>Do you feel more acceptable if you smoke?</td>
<td>265 (86.6)</td>
<td>26 (8.5)</td>
<td>15 (4.9)</td>
</tr>
<tr>
<td>Will you encourage others to smoke?</td>
<td>289 (94.4)</td>
<td>5 (1.6)</td>
<td>12 (3.9)</td>
</tr>
</tbody>
</table>

Table 7 represents the attitude of medical students about association of education and usage of tobacco, and about the initiatives which has taken by the government to halt the smoking. From the table it can be illustrated that more than 80% of the students were totally unsatisfied by the steps that government has taken to reduce the usage of tobacco in the country. Moreover, in the opinion of 293 (95.8%) students’ statuary warnings that is imposed by the cigarette manufacturing companies on the cigarette packs are not enough that it can help or motivate a smoker to quit smoking. Educational level of a person is the major obstacle which can prevent a person to indulge yourself in smoking, and 223 students (72.9%) had the same opinion in this regard, however less than quarter of the total students (17.3%) thought that education has nothing to do with a person’s choice regarding usage of tobacco. More than 90% of the medical students contemplated that as the medical professionals and medical students are the prime model of health for the society so if they smoke then it may discourage a patient to give up his or her smoking habit.
Table 7 General attitude of medical students regarding influence of education and smoking

<table>
<thead>
<tr>
<th>Questions type</th>
<th>Response N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td>The Ministry of Health in Pakistan is working properly to reduce smoking?</td>
<td>248 (81.0)</td>
</tr>
<tr>
<td>Statuary warnings on the cigarettes packs are enough to limit smoking?</td>
<td>293 (95.8)</td>
</tr>
<tr>
<td>Do you think education helps to reduce smoking trends?</td>
<td>53 (17.3)</td>
</tr>
<tr>
<td>If medical students and doctors smoke, does it convey negative message to patients/public?</td>
<td>15 (4.9)</td>
</tr>
</tbody>
</table>

5.10 Smoking among medical students

In this study sample, out of 306 medical students only 41 students (13.4%) were smokers while remaining 265 (86.6%) were not smokers. There was an increase in smoking trend as the students were promoting from the pre-clinical years to clinical years that is in first professional year there was only 9 smokers (12.7%) as compared to the fifth professional year which had 14 smokers (23.3%). A double upsurge was observed in the presence of smokers when comparison was done between the first and fifth professional year. Third and fourth year had the same percentage of smokers’ that is 11.1% and 13.1% respectively with a minor difference. However, second professional year was the only class of medical students which had the least presence of smokers and they counted only 4 (6.9%). Pearson chi-square test was done between the two variables including academic years and smoking prevalence among medical students and results obtained were statistically non-significant (p-value 0.110) on the whole.
Table 8 Smoking prevalence among medical students in different professional years

<table>
<thead>
<tr>
<th>Professional year (No. of students)</th>
<th>Smokers N (%)</th>
<th>Non-smokers N (%)</th>
<th>P-Value$^4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; year (71)</td>
<td>9 (12.7)</td>
<td>62 (87.3)</td>
<td></td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; year (58)</td>
<td>4 (6.9)</td>
<td>54 (93.1)</td>
<td></td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; year (63)</td>
<td>7 (11.1)</td>
<td>56 (88.9)</td>
<td>0.110</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt; year (54)</td>
<td>7 (13.0)</td>
<td>47 (87.0)</td>
<td></td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt; year (60)</td>
<td>14 (23.3)</td>
<td>46 (76.7)</td>
<td></td>
</tr>
<tr>
<td>Total no. of students = 306</td>
<td>41 (13.4)</td>
<td>265 (86.6)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5 epitomizes presence of medical students who smoke in all professional years of medical course. Presence of smokers was even less than the quarter of the total medical students present in the medical school. Smokers counted only for 13.40% as compared to the non-smoker medical students which were 86.60% on the whole.

Figure 6 signifies the smokers in each professional year of medical school. It is clear from the bar chart that second professional year medical students (6.90%) accounts for the least number of smokers present in the school, then this trend has shoot up to the proceeding professional years. Hence, fourth professional year (13%) and fifth professional year (23.3%) had the greatest number of smokers as compared to the students of following professional years.

$^4$ Pearson’s chi-square
Figure 5 Presence of smokers and non-smokers among medical students

Figure 6 Smokers and non-smokers in five professional years of medical school
Table 9 signifies the occurrence of smoking regarding gender wise among male and female students. Table data depicts that tobacco usage is more than 5 times (34.20%) among males as compare to the smoking prevalence among females (6.20%). Correspondingly, proportion of female non-smokers (93.80%) is much higher as compare to the non-smokers present among the male students (65.80%) and results obtained in this regard are statistically significant (p-value 0.000)

Table 9 Prevalence of smoking among male and female medical students

<table>
<thead>
<tr>
<th>Gender</th>
<th>Smokers N (%)</th>
<th>Non-smokers N (%)</th>
<th>P-value(^5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>27 (34.20)</td>
<td>52 (65.80)</td>
<td>0.000</td>
</tr>
<tr>
<td>Female</td>
<td>14 (6.20)</td>
<td>213 (93.80)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>41 (13.40)</td>
<td>265 (86.60)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7 Smoking prevalence among male and female students

\(^5\) Fischer’s exact test
Place of residence imposes an influence on the smoking status of a person. From the following table it can be seen that the medical students who had the rural background were more prone to smoking as compare to the students from the metropolitan areas (p-value 0.002).

**Table 10 Smoking prevalence among medical students regrading place of residence**

<table>
<thead>
<tr>
<th>Place of residence</th>
<th>Smokers N (%)</th>
<th>Non-smokers N (%)</th>
<th>p-value&lt;sup&gt;6&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural 57 (18.60)</td>
<td>15 (26.30)</td>
<td>42 (73.70)</td>
<td>0.002</td>
</tr>
<tr>
<td>Urban 249 (81.40)</td>
<td>26 (10.40)</td>
<td>223 (89.60)</td>
<td></td>
</tr>
<tr>
<td>Total 306 (100)</td>
<td>41 (13.40)</td>
<td>265 (86.60)</td>
<td></td>
</tr>
</tbody>
</table>

Following bar chart characterizes the usage of tobacco by the medical students who live in the rural and urban areas.

![Smoking prevalence among urban and rural medical students](chart.png)

*Figure 8 Smoking prevalence among medical students in accordance with place of residence*

<sup>6</sup> Pearson’s chi-square test
Table 11 categorizes the students as a smoker and non-smoker according to the presence of smoker or non-smoker family member within the family.

Table 11 Influence of smoking family member on medical student’s smoking status

<table>
<thead>
<tr>
<th></th>
<th>Smokers N (%)</th>
<th>Non-smokers N (%)</th>
<th>p-value(^7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student’s family having smoker</td>
<td>140 (36.6)</td>
<td>26 (18.57)</td>
<td>114 (81.42)</td>
</tr>
<tr>
<td>Student’s family having no smoker</td>
<td>166 (54.2)</td>
<td>15 (9.03)</td>
<td>151 (90.96)</td>
</tr>
</tbody>
</table>

From the following bar chart, presence of smoking and non-smoking students can be assessed according to the criteria of presence of smoking and non-smoking family members.

Figure 9 Impact of smoking and non-smoking family member on medical students

\(^7\) Fischer’s Exact Test
If a family member smoke in a family, it definitely effects the other members of the family who are non-smokers (p-value 0.018). From the above chart and table, it is concluded that students who had smoking family member in their family were more likely to become tobacco user as compared to students who didn’t have any family member who smoke. Out of 41 smoking medical students, 26 medical students (18.57%) had smoking family member whereas families of 15 medical students (9.03%) didn’t have any smoking family member.

Following table represents the prevalence of smoking among medical students according to the income of families per month. In this case, result was statistically insignificant (p-value 0.925) as it can be observed that monthly earnings of families have nothing to do regarding tobacco usage among the medical students. The occurrence of smokers and non-smokers was almost same in all the four categories which was designed according to the average income of the families of the participants.

Table 12 Smoking prevalence among medical students in accordance with the family income

<table>
<thead>
<tr>
<th>Family income per month in PKR.(^8)</th>
<th>Smokers N (%)</th>
<th>Non-smokers N (%)</th>
<th>p-value(^9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10,000</td>
<td>1 (25)</td>
<td>3 (75)</td>
<td></td>
</tr>
<tr>
<td>10,000-29,000</td>
<td>5 (13.15)</td>
<td>33 (86.04)</td>
<td>0.925</td>
</tr>
<tr>
<td>30,000-49,000</td>
<td>9 (13.04)</td>
<td>60 (86.95)</td>
<td></td>
</tr>
<tr>
<td>50,000 or more</td>
<td>26 (13.33)</td>
<td>169 (86.66)</td>
<td></td>
</tr>
</tbody>
</table>

\(^8\) Pakistani rupee  
\(^9\) Pearson’s chi-square test
6 DISCUSSION

6.1 Main findings of study

The main findings of this study are:

6.1.2 Knowledge of medical students

- Medical students had poor knowledge regarding legal age of smoking in their country, and this trend was almost same in each medical professional year.
- Almost all medical students (98.4%) that participated in this study were well aware about the harmful effects of smoking on health.
- A very little proportion of medical students (1.3%) considered the effects of smoking as a stimulant during the examination period of their studies, so they smoked occasionally.
- All the medical students had knowledge of the major diseases which have the direct or indirect link with the tobacco usage. The knowledge of medical students of final professional year was much better and precise as compared to the previous medical professional years.
- Medical students were also very well aware of lung malignancies and other pulmonary diseases, though malignancies apart from lungs (breast, urinary bladder etc.) were less known to the medical students.
- Major proportion of the medical students (77.5%) had no knowledge about the modern ways of smoking like electronic cigarette.

6.1.3 Attitudes of medical students

- A very little proportion of the medical students (11.1%) participated in anti-smoking campaigns, and fourth and final year students were least interested as compared to first and second year students.
- 80% of the medical students thought that there is a solid influence of smoking on the non-smoking members of a family, if a family member smokes in the family.
- More than 50% of the medical students were reluctant to be open to their parents regarding their smoking status.
• Major proportion (94%) of the medical students had an opinion that if they smoke they will not inspire other to smoke, as tobacco usage is based totally on a person’s own discretion. However, more than 90% of the participated candidates considered that medical doctors are the role models for the society, so their smoking status has a major influence on their patients and society.
• More than 80% of the medical students were not satisfied with the steps taken by their government to promote smoking cessation.
• More than half of the students thought that education is the major factor which prevents a person from smoking. However, less than quarter thought that education and smoking has no link.

6.1.3 Practice regarding smoking among medical students

• Number of smokers was even less (13.4%) than the total number of participants in study.
• Prevalence of smoking was higher in final year medical students as compared to first year medial students
• Some students preferred the occasional smoking during their examination period to increase their cognitive activity due to presence of nicotine in the tobacco smoke.
• Tobacco usage was 5 times more common among males as compared to smoking prevalence in female medical students.
• Medical students who had the rural background were more prone to smoking as compared to the students of metropolitan or urban areas.
• Medical students who had a smoking family member had more chances of being a smoker as compared to medical students who didn’t have any family member who smoke.
• Financial status of families of medical students had no influence on the choice of participants about tobacco usage.
6.2 Comparison with existing scientific evidence

The prevalence of smoking among medical students of KMSMC who participated in this study was relatively low (13.4%) as compared to total cohort of study. Tobacco usage was doubled among final year medical students (23.3%) as compared to the first year medical students (12.7%). Smoking prevalence among the medical students of University of Kuopio, Finland is almost same (15%) as the smoking prevalence among KMSMC medical students (13.4%), though there is a minor difference (Toriola 2007). In this study, an increase in smoking prevalence was found when comparing the first year students (12.7%) and final year students (23.3%) and medical students were becoming frequent consumer of tobacco as they were progressing thorough medical years, the same trend had seen among medical students of other European countries (Tessier et al. 1992).

Out of 41 smokers in this study, only 14 are female smokers (6.2%) and 27 are male smokers (34.2%), smoking prevalence among the females is very low and the possible reason behind is that tobacco usage among females in Pakistan is considered as a taboo so females especially young women rarely smoke or never exposed their smoking habit to society. A similar trend was also noticed in another study conducted by Alam (1998) to assess the smoking prevalence among males and females all around the Pakistan, out of 9441 participants only 21.6% were smokers, out of which 36% were males and 9% were females. So it can be seen not only in medical schools but also in Pakistani society smoking is more prevalent in males as compared to females. In case of smoking among medical students of University of Kuopio, Finland, females (11.22%) used more tobacco as compared to female smoking students (6.2%) of KMSMC medical school (Toriola 2007). The increasing trend of tobacco usage during their medical education is same all over the world, as it has been seen in number of studies conducted in Asian countries like China, Middle East countries like Bahrain, African and European countries as well (Tessier et al. 1989, Tessier et al. 1992a, b, Hamadeh 1994, Zhu et al. 2004).

In Pakistan, smoking prevalence is more common in general population as compared to the medical school students. Similar results have observed in number of studies. In Denmark, smoking prevalence among general population was almost doubled (40%) as compared to the smoking prevalence among the medical students (20%). General population of UK had also shown the same trend where smokers’ proportion in general population was 33% whereas among medical students
was only 11% (Richmond 1999, Melani et al. 2000). One reason of upward trend of smoking among the medical students during their academic period was the stress and extra pressure of the studies which they face, as in this study 4 students (1.3%) mentioned that they smoke to cope the stress and anxiety of examination period and to boost up their cognitive ability by inhaling the nicotine contents via tobacco smoke. This is somewhat similar to the study conducted by Mitchel et al. (1983) in which it was mentioned that medical students face long-term and acute stress during their educational period and it resulted in the adoption of new addictions and habits. Same reason of smoking among medical students of Akdeniz university of Turkey was mentioned that students may face anxiety during their education period and they adopt smoking to cope with the stress. Due to this anxiety, students are more prone to be users of tobacco (Senol at al. 2006).

As it is expected that medical professionals who generally have better knowledge of health related matters as compare to general population smoke less and their education level helps them to avoid tobacco usage. In this study students had same opinion and more than 70% students thought that educational level of a person is the primary factor which helps them to avoid smoking. More the knowledge a person has less are the chances of them becoming a smoker and vice versa. And in case of medical professionals and medical school students should be less prone to smoking, in general. Conversely, less than quarter of the students (17.3%) considered that adoption to smoking habit is not influenced by a person’s knowledge level. More than 90% of the medical students considered that as medical doctors and medical students are prime models for the society, they should be non-smokers so that their smoking patients should not be discouraged. The same logic had seen in many studies that physician’s work place should be smoke free and it is advocated that if physicians are non-smokers in a society, patients feel more comfortable in communicating about their smoking related problems. Additionally, if a physician or medical student smokes then definitely they would have some problem in encouraging the patients to cease smoking and counselling their patients as well (Nett 1990, Sameuls 1997, Garfinkel 2008).

Students of KMSMC had in-depth knowledge of the diseases and other malignancies which are directly or indirectly related with the tobacco usage. In spite of that smoking trend was higher as the students were compared between pre-clinical year and clinical year of medical course and there was a major difference of smoking prevalence between first year and final year medical students. However, there should be some sort of training for the medical students and physicians to stop the
ascending trend of smoking in medical professionals. Similarly, medical students of Agha Khan University, Karachi, Pakistan had extensive knowledge related to danger of smoking but they have suggested that medical professionals and students should have the proper training for smoking cessation. Proper training and counselling must be included in medical curriculum of medical profession (Khan et al. 2005). Gaps has noted among the medical students of University of Lagos, Nigeria regarding knowledge related to risks and complications associated with tobacco usage (Dania et al. 2015). On the whole, whether medical students have extensive or limited knowledge of smoking related complications, diseases and risks associated, there is a need for the inclusion of medical training related to smoking cessation and counselling at very early stage of medical profession curriculum.

Participation of medical students of KMSMC in anti-smoking campaigns was very less (11.11%) as compared to total number of participant in this research study. Maximum participation was noticed from the first and second professional year and least participation was by the medical students of final year of medical course. It was observed that as the medical students were getting closer to graduation, their interest in smoking cessation programs was subsiding. In many studies, same trend was noticed that medical professionals were least interested in participating in such programs and policies and they were never exposed to smoking cessation programs. Number of studies had suggested that there should be targeted formulated campaigns and a self-care program for the medical professionals so that they become fully trained in dealing with the smoking patients in future. Participation in such programs should be necessary for the medical professionals as they play a major role in smoking cessation program in the society (Xiang et al. 1999, Haddad & Malak 2002, Vakefliiu et al. 2002). Moreover, more than 90% of the students of KMSMC students were not satisfied with the statutory warnings on cigarette packs as a tool that can discourage the smokers to smoke. According to them, steps and initiatives taken by the ministry of health of Pakistan are not enough to reduce the ratio of smokers in the country. Similar thoughts were represented by the first and final year students of New South Wales of Sydney as they were also not satisfied by the cautionary warnings on the cigarette packages and they had suggested that there should be a ban on advertisements promoting tobacco usage (Richmond & Kehoe 1997).
The place of residence of a person also puts a great influence on the choice of a person to smoke or not, in this particular study, students who had a rural background were more likely to be smokers (26.3%) as compared to students who live in urban areas (10.4%) and when this prevalence was compared with another study conducted on general population of Pakistan, similar results were noticed that is in general population majority of smokers (22%) were belong to rural areas as compared to urban areas (20.7%) (Alam 1998).

This study revealed that there was a strong relationship between the presence of a smoking family member in a family and its influence on the non-smoking members of the family. Among KMSMC students, those students who had smoking family member had double chances of being smoker as compared to the students who had not any smoking family member. This trend is similar with the study conducted in USA to rule out the association of smoking status of parents and adolescents. It was also found in the same study that beside of smoking status, education status and monthly income of the parents may influence the adolescent’s choice to smoke. Education level and household income of the parents had adverse effects on the smoking prevalence of adolescents. In other words, socioeconomic status (SES) of parents was inversely proportional to the adolescents smoking status (Soteriades & DiFranz 2003). Similar results were concluded in another study which was conducted in Finland that if parents smoke then students will be definitely inspire by their parents smoking status (Pennanen 2012). But this study which was conducted on KMSMC students didn’t confirm this, as this study showed that monthly income of the families of students had nothing to do with the choice of students to use tobacco. Reasoning for dissimilarity of results may lie in the cultural makeup of the societies.

6.3 Validity and reliability of study

Results of this study were obtained by using questionnaire which was constructed with the help of literature reviews of previous studies in the same field. Piloting was conducted before the actual data collection survey in order to improve the questionnaire’s aim, content and logistics. One thing which is necessary to mention here is that female smoking is considered as a taboo in South Asian societies so this can be a reason that why female subjects of this study were reluctant to disclose about their smoking status, as there were total only 14 female smokers (6.2%) even though major portion of participants was covered by female participants (74.2%) as compared to males (25.8%).
However, identity of the participants was kept anonymous in the questionnaire so that female can disclose their smoking status without any hesitation if they do, to attain the maximum reliable results of this study. Though, results of this study cannot be validated to the medical schools of whole country as there are eight divisions of Pakistan and more than 90 medical schools, including public and private sector, in country so this study cannot represent the knowledge, attitude and practice regarding smoking among all the medical students of Pakistan. For this purpose, more detailed studies are needed.

6.4 Strengths and weaknesses of study

According to current knowledge, this is one of the few studies which are done in Pakistan and the very first one in South-Punjab region to assess the knowledge, attitude and practice of medical students regarding smoking. Previously, many studies were done on medical students regarding smoking but in those studies only first year and final year students were included, whereas in this study students of all professional years were included to assess the knowledge, attitude and practice of medical students regarding smoking in a more extensive way. In this study, besides assessing knowledge, attitude and practice of medical students regarding smoking, influence of smoking family members on non-smoking members of family and association of other socioeconomic factors with smoking were also studied. Participation of medical students in anti-smoking campaigns and their opinions about smoking habits of physicians and medical students and their influence on patients were also evaluated. Moreover, knowledge of medical students regarding number of diseases and malignancies which are linked directly or indirectly with smoking were measured. By considering these points, curriculum of medical education can be formulated keeping in mind the future challenges which a physician can face related to smoking patients.

Many questions of the questionnaire used in this study were derived from the literature and questionnaires used in the past in similar studies, although some questions were modified to achieve the specific objectives and aims of this study. One of the main strengths of this study is that participants were educated and proficient in English language which exempted this study from misunderstanding on part of the subjects. Furthermore, before initiating the actual study, piloting of questionnaire among participants was done to rule out any confusing questions as the research tool was only a questionnaire which required no explanation from researcher and research assistant.
as well. These strengths of the study permit significant conclusions about the knowledge, attitude and practice regarding smoking among medical students to be made. One of the limitations of this study include moderate participation rate (61%) by the medical students, a higher response rate might have affected the overall results of this study. Another fact which is mentioned earlier regarding considering the smoking as a taboo among females in South Asian societies has also posed some limitations on this study. Out of total participants of this study female participants were approximately 75% and may be the most of them were reluctant or reticent to express their smoking habit in this study. Additionally, this study was conducted in one of the eight divisions of Pakistan, so the results of this study may not be applicable to the whole country.

6.5 Implications for future research, policy and practice

- Inclusion of a detailed and separate course in medical curriculum regarding tobacco control and effects of smoking on health should be made compulsory. This course must be started from first year of medical course till the time of graduation.
- After graduation, during the residency period of medical graduates, inclusion of training to deal with in and outdoor patients who are tobacco users must be done.
- It should be compulsory for all the medical students to be involved in some anti-tobacco policies and programs and similar workshops regarding smoking cessation techniques and other related matters so that before practicing as professional doctors they become fully trained in this field.
- Participation of medical students in local and national surveys about smoking related matters should be made obligatory by the government.
- A survey at specific intervals should be carried out among the medical students to rule out the smoking prevalence among medical students and then such data should be compared with general population and physicians as well so that trends can be monitored and evaluated.
- Medical students must be acquainted with the latest methods of smoking like electronic cigarettes, so that they can deal with their patients with full competency.
7 CONCLUSION

Despite the good knowledge of smoking related diseases and complications, smoking prevalence was increasing as the medical students were getting closer to graduation. To cope with stress and anxiety related to examination period, some students preferred occasional smoking to stimulate their cognitive abilities. Participation of medical students in anti-smoking program and campaigns was very low which shows their lack of interest in acquiring knowledge about smoking cessation techniques and other related issues. These observations should be considered when developing the curriculum for medical schools so that by the time of completion of medical course, qualified physicians should be familiar with every aspect of smoking and its related consequences.
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9 APPENDICES

9.1 Questionnaire

Serial Number: ____________
Medical School Year: ____________

Questionnaire

Hello! I am Barkat Ali Babar from University of Eastern Finland. Kuopio, Finland. I am conducting research with the title, “Knowledge, Attitude and Practice regarding Smoking among Medical Students in Pakistan”. For this purpose, I am gathering this information. I would appreciate if you can respond to this questionnaire. It will take approximately 15 minutes of your time. It is entirely up to you whether you participate or not but your responses would be valuable for my research thesis. I assure you that all the information gathered will be kept confidential, and solely used for educational purpose. I thank you for your cooperation.

Questionnaire Instructions

Please answer each of the question by circling on the available option or writing the answer. Thank you.

A. Some questions about you.

1. What is your Class (Year)? ..............
2. What is your Gender?
   1. Male
   2. Female
3. What is your Age? ..............
4. What is your marital status?
   1. Married
   2. Unmarried
   3. Divorced/ Separated
   4. Widow/ Widower
5. What is your place of residence?
   1. Rural
2. Urban

6. How much your family earn in one month on average?
   1. Less than 10,000 PKR
   2. 10,000 – 29,000 PKR.
   3. 30,000 – 49,000 PKR.
   4. 50,000 or more PKR.

B. Questions regarding your knowledge about effects of smoking on health.

7. What is the legal age for smoking in Pakistan? --------------- Years.

8. What do you think of the smoking’s effect on health?
   1. Harmful
   2. No effect
   3. Good

9. What kind of effects/diseases smoking can cause?
   1. ------------------------
   2. ------------------------
   3. ------------------------
   4. ------------------------
   5. ------------------------

10. Are you familiar with any connection between smoking and following?
    (Please answer each of the following by marking ✔ the appropriate box)

<table>
<thead>
<tr>
<th></th>
<th>Unfamiliar</th>
<th>Some Knowledge</th>
<th>Familiar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung Malignancies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Pulmonary Diseases (COPD*, Bronchitis, Emphysema etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malignancies apart from lungs (Breast, Urinary bladder etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Adverse Health Effects (Hypertension, Hypercholesterolemia etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Chronic Obstructive Pulmonary Disease
11. What methods of smoking are common in your community?

1. ------------------------
2. ------------------------
3. ------------------------
4. ------------------------
5. ------------------------

12. What other substances are used for smoking other than tobacco in your community?

1. ------------------------
2. ------------------------
3. ------------------------
4. ------------------------
5. ------------------------

C. Questions regarding general attitude towards smoking.

(Please answer each of the following by marking ✓ the appropriate box)

<table>
<thead>
<tr>
<th>Question</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Do you think people are influenced by their family members who are smokers?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Do you think people are influenced by their friends who are smokers?</td>
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<td></td>
<td></td>
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<tr>
<td>15. Do you feel more acceptable if you smoke?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>16. Do you think your smoking status affects your relations with the others?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Would you like to be open to your parents about your smoking status?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Will you encourage others to smoke?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

19. Have you ever attended any anti-smoking campaign?

1. Yes
2. No
(Please answer each of the following questions by marking ✓ the appropriate box)

<table>
<thead>
<tr>
<th>Question</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. The ministry of health in Pakistan is working properly to reduce smoking?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Statutory warnings on the cigarettes packs are enough to limit smoking?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Do you think education helps to reduce smoking trends?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. If medical students and doctors smoke, does it convey negative message to patients/ public?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Some questions related to practicing smoking.

24. Is there anybody in your family who smokes?
   1. Yes
   2. No

If answer to question no. 24 is yes, then answer the following question.

25. Who smokes in your family?
   1. ------------------------
   2. ------------------------
   3. ------------------------
   4. ------------------------
   5. ------------------------

26. Have you ever smoked?
   1. Yes
   2. No

If answer to question no. 26 is yes, then answer the following question.

27. What was your age when you started smoking?
   1. Less than 18 years
   2. More than or equal to 18 years.

28. Do you remember with whom you first smoked?
1. Friends
2. Siblings
3. Relatives
4. Alone

29. What did you smoke first time?
   1. Tobacco
   2. Any other ______________.

30. How did you smoke?
   1. Cigarette
   2. Beedi
   3. Cigar
   4. Any other ______________.

31. Do you smoke currently?
   1. Yes
   2. No

If answer to question no. 31 is yes, then answer the following question.

32. How do you smoke currently?
   1. Cigarette
   2. Beedi
   3. Cigar
   4. Any other ______________.

33. What drug do you smoke currently?
   1. Tobacco
   2. Any other ______________.

34. How often do you smoke?
   1. Rarely
   2. Often
   3. Regular

35. How much do you smoke in a day?
   1. Less than 1 pack (12 Cigarettes)
   2. More than 1 pack (12 Cigarettes)
36. Have you ever used/heard of electronic cigarette?

1. Yes
2. No

Thank you for your participation.