Predicting tobacco use among high school students by using the global youth tobacco survey in Riyadh, Saudi Arabia

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Abstract:
OBJECTIVE: To identify the predictors that lead to cigarette smoking among high school students by utilizing the global youth tobacco survey in Riyadh, Kingdom of Saudi Arabia (KSA).

METHODS: A cross-sectional study was conducted among high school students (grades 10–12) in Riyadh, KSA, between April 24, 2010, and June 16, 2010.

RESULTS: The response rate of the students was 92.17%. The percentage of high school students who had previously smoked cigarettes, even just 1–2 puffs, was 43.3% overall. This behavior was more common among male students (56.4%) than females (31.3%). The prevalence of students who reported that they are currently smoking at least one cigarette in the past 30 days was 19.5% (31.3% and 8.9% for males and females, respectively). "Ever smoked" status was associated with male gender (OR = 2.88, confidence interval [CI]: 2.28–3.63), parent smoking (OR = 1.70, CI: 1.25–2.30) or other member of the household smoking (OR = 2.11, CI: 1.59–2.81) who smoked, closest friends who smoked (OR = 8.17, CI: 5.56–12.00), and lack of refusal to sell cigarettes (OR = 5.68, CI: 2.09–15.48).

CONCLUSION: Several predictors of cigarette smoking among high school students were identified.

Key words: Adolescents, cigarettes, Saudi Arabia, tobacco

Mortality due to tobacco use continues to rise worldwide and is expected to cause ten million deaths by the year 2020.[1,2] This public health problem has led to initiatives in developed countries to ban smoking and implement effective antismoking measures, which has resulted in an almost 50% drop in tobacco consumption over the past three decades.[3] However, in developing countries, tobacco consumption continues to increase by approximately 3.4% annually.[4] The non-communicable disease risk factors standard report from the Kingdom of Saudi Arabia (KSA) on 2005 revealed that 20.9% of men and 1.4% of women were current smokers.[5] Other local literature suggests that the prevalence of tobacco use may be as high as 34%.[7-10] Moreover, women and young adults are increasingly using tobacco.[11,12] To address the problem of youth smoking, the World Health Organization, together with the United States Center for Disease Control and Prevention and the Canadian Public Health Association, has established the global youth tobacco survey (GYTS) as part of the global tobacco surveillance system.[13,14] The GYTS is a school-based survey that collects data on students aged 13 to 15 years using a standardized methodology for constructing the sample frame, selecting schools and classes, and processing data. The GYTS surveillance system is intended to enhance the capacity of countries to design, implement, and evaluate tobacco control and prevention programs. While the GYTS provides a standardized methodology process in terms of sampling size, data collection, data management, and processing technique, it is flexible enough to be used in different cultures. In the KSA, Al- Bedah et al. used the GYTS among intermediate-level school students (7th-9th grades) in 2001–2002 and 2007.[15] However, a major limitation of this study is that the 2001 survey included only male students. These surveys showed that between 2001–2002 and 2007, there was a trend toward increased cigarette smoking among male students, indicated by increases in the number of students who reported that they had tried smoking (from 34.5% to 39.5%) and students who currently smoked (from 10.8% to 13.0%). Moreover, there was an increase in the number of students who wanted to try smoking (from 6.7% in 2001–2002 to 20.6% in 2007). We have also previously reported that the prevalence of ever smoked was 42.8% and current smoking was 19.5%.[8] Thus, our objective was to identify the predictors that may lead to tobacco product consumption by utilizing data collected through the GYTS among high school students in Riyadh, KSA.
We conducted a cross-sectional study using the GYTS among high school students in Riyadh, KSA, between April 24, 2010 and June 16, 2010.

Sample size and selection
A modified standardized methodology for conducting the GYTS was applied. The main deviation was applying it on age group 15-18 years and analyzing items in the GYTS questionnaire pertained to the study objective. This age group is correspondent to high school, a three-year phase of the education system in the KSA. Schools and participants were selected by a two-stage cluster sampling method. Riyadh is the capital of the KSA with a population of approximately five million inhabitants. The city has 405 high schools, with 160 (39.5%) for boys and 245 (60.5%) for girls. There are also 185 private schools (45.7% of total schools), which provide education for both genders segregated into two different buildings. For sampling purposes, each gender-based section was considered as a school. Of the 161 223 high school students in the academic year of 2009–2010, 83 056 (51.5%) students were boys and 78 167 (48.5%) were girls. For the purposes of sampling, we divided the city of Riyadh into four parts based on the location of two major highways, King Fahd Road and Khurais Road. The next stage of cluster sampling collection involved random selection of classrooms within each school. A total of 46 schools (11.4%) with 20 034 students (12.4%) were included. This sample included 9 971 boys (49.8%) and 10 063 girls (50.3%). Based on the probability proportional sample technique using different regions and schools, 10% of the schools from each part of the city were selected. Twelve schools were selected from the northern section of the city (6 boys’ schools and 6 girls’ schools), 10 schools were selected from the southern part (5 boys’ schools and 5 girls’ schools), 14 schools were selected from the eastern part (7 boys’ schools and 8 girls’ schools), and 10 schools were selected from the western part (5 boys’ schools and 4 girls’ schools). Three classes from each school were selected to represent the three grades, which resulted in a total of 138 classes. Each class was considered a cluster. For practical feasibility, assuming the principle of normal distribution, a minimum sample size of 30 boys and 30 girls from each school was selected. Ten students from each class were selected randomly by systematic sampling technique by using attendance list as sampling frame. This resulted in a total sample size of 1 380 students. The questionnaire was supervised by medical students who had attended a workshop on the study project that explained the GYTS, its methodology, and the importance of being neutral while administering the questionnaire.[36]

Statistical analysis
Data were analyzed using SAS V9.1 software (SAS Institute, NC). The variables were summarized and reported using descriptive statistics. Categorical variables were reported using frequency distributions and proportions. Analytic statistics for logistic regression were used to analyze the relationship between dependent variables and some independent variables, and the results are reported in terms of odds ratios, 95% confidence interval (CI), and P value. A P value ≤ 0.05 was considered significant.

Questionnaire
The GYTS is a school-based, anonymous, self-administered questionnaire. It includes 56 questions designed to gather data on the following domains: the knowledge and attitudes of young people toward cigarette smoking, the prevalence of cigarette smoking and other tobacco use, access to cigarettes, tobacco-related school curriculum, exposure to environmental tobacco smoke, cessation of cigarette smoking, and sociodemographic background. To address the objective of this study, certain questions were selected from the GYTS [Table 1]. “Current smokers” were defined as students who had smoked at least once during the previous 30 days. “Ever smokers” were defined as students who had ever smoked even just one or two puffs. Those ever smokers that are not current smokers were labeled as “non-current smokers.” “Never smoked” are those who never have tried smoking. “Ever smoked” are those who tried smoking even one-two puffs.

Ethical approval and consent
This study is part of a survey that was conducted to address asthma and smoking. Permission to perform the study was obtained from the Ministry of Education. Ethical approval was obtained from the research and ethics committee of the Saudi Thoracic Society. Verbal consent from students was obtained after explaining the purpose of the study in detail and confirming the confidentiality in handling and storing the surveys, which kept each questionnaire anonymous.

Table 1: Questions selected from the global youth tobacco survey

|   | Question                                                                 |
|---|--------------------------------------------------------------------------|
| 1 | Have you ever tried or experimented with cigarette smoking, even one or two puffs? |
| 4 | During the past 30 days (one month), on the days you smoked, how many cigarettes did you usually smoke? |
| 7 | During the past 30 days (one month), did anyone ever refuse to sell you cigarettes because of your age? |
| 17 | Do your parents smoke cigarettes? |
| 19 | Does anyone in your house other than your parents smoke cigarettes? |
| 28 | Do you think cigarette smoking is harmful to your health? |
| 30 | Do any of your closest friends smoke cigarettes? |
| 32 | If one of your best friends offered you a cigarette, would you smoke it? |
| 38 | Do you think it is safe to smoke for only a year or two as long as you quit after that? |
| 39 | Do you think the smoke from other people’s cigarettes is harmful to you? |
| 43 | Are you in favor of banning smoking cigarettes in public places (such as in restaurants, in buses, streetcars, and trains, in schools, on playgrounds, in gyms and sports arenas, in discos)? |
| 45 | Do you want to stop smoking cigarettes now? |
| 47 | During the past year, have you ever tried to stop smoking cigarettes? |
| 51 | Have you ever received help or advice to help you stop smoking cigarettes? |
| 62 | During this school year, were you taught in any of your classes about the dangers of smoking? |
| 64 | How old are you? |
| 65 | What is your sex? |
| 66 | In what grade/form are you? |
Results

Of 1380 questionnaires, 1272 were returned, yielding a response rate of 92.2%. The final study population included 606 male students (47.6%) and 666 female students (52.4%), after excluding 15 patients who did not include the gender or smoking status.

There were 15 (1.2%) questionnaires that did not include a response in the gender status. Students who had “never smoked” made up 56.7% of the study population. The prevalence of “ever smoked” was 43.3% (56.4% of males and 31.3% of females). Currently smoking students made up 19.5% of the population (30.6% male students and 8.9% female students) [Table 2].

Table 3 shows that smoking was more prevalent among second- and third-year high school students compared with first-year students (P = 0.014). Although there was no statistical difference based on geographical distribution, the prevalence of smoking was higher among private schools compared with governmental schools (P = 0.0065). A higher prevalence of smoking was observed among the parents of the category “ever smoked” (35.2%) compared with students in the “never smoked” category (24.2%) (P = 0.0042). Similar observations were noted related to the presence of smokers other than parents at home or smoking among closest friends (P < 0.0001). Moreover, 69.5% of “ever smoked” would accept cigarettes from a friend compared with 16.2% of “never smoked” (P < 0.0001). Of the 191 students among the category “ever smoked,” 179 (93.7%) were able to buy cigarettes without any age-related restrictions. There was a stronger belief among “never smoked” that passive smoking was harmful (P = 0.0002) and smoking per se was harmful as well (P < 0.0001). Regarding smoking bans, 780 students (81.4%) in the “never smoked” category were in favor, compared with 137 (58.8%) of “ever smoked” category (P < 0.0001). The “intention to smoke in the next 12 months” was found to be 61.8% among “ever smoked” compared with 10.4% among “never smoked” (P < 0.0001). A percentage of 56.7% of “ever smoked” believed that they could smoke for 1 to 2 years and then quit, compared with 41.9% of the “never smoked” (P = 0.0002). Among “ever smoked,” 52.3% would like to quit smoking and 49.2% had attempted to quit. Almost half of the groups of “ever smoked” and “never smoked” believed that the school’s curriculum included smoking dangers, although these percentages did not reach statistical significance (P = 0.1937).

A logistics regression analysis was used to analyze the relationship between the dependent variable of smoking status “ever smoked” and a panel of independent variables [Table 4]. Male gender was observed to be associated with smoking (OR = 2.80, CI: 2.28–3.63). Although the presence of a smoker close to the student, e.g., parents, other members at home, or friends, increased the chance of smoking, a strong association was identified among close friends (OR = 8.17, CI: 5.56–12.00). Moreover, the strongest association was related to the variable “offered a cigarette by a friend” (OR = 17.46, CI: 11.59–26.27). Lack of refusal to sell cigarettes was another strong factor that increases the chance of smoking (OR = 5.68, CI: 2.09–15.48). The belief that one could smoke for 1 to 2 years then quit showed some association with the status of “ever smoked” (OR = 1.57, CI: 1.15–2.14), whereas the belief that both passive smoking and actual smoking is harmful reduced one’s likelihood of smoking (OR of 0.45, CI: 0.31–0.67 and 0.40, CI: 0.22–0.75, respectively). Similar observations were made when the logistic regression model was extended to further stratify the risk for continual smoking among current and non-current smokers [Table 5]. With the exception of the presence of other smokers at home, favoring the banning of smoking and the belief that it is safe to smoke for 1 to 2 years then quit did not show similar associations when compared with the previous model ([OR = 1.08, CI: 0.58–2.00], [0.69, CI: 0.35–1.0], and [OR = 0.9, CI: 0.48–1.71], respectively). The strongest association was identified among male students or those who had a parent who smoked (OR = 6.39, CI: 3.27–12.38) and [OR = 3.42, CI: 1.79–6.53], respectively).

Discussion

This study identified several predictors of cigarette smoking among high school students. The overall prevalence of prior experience with smoking in the surveyed students was 43.3% (56.4% of the male students and 31.3% of the female students). Moreover, 19.3% of the students reported having smoked at least one cigarette in the previous 30 days (30.6% of the male students and 8.9% of the female students), which is consistent with international data reporting that two of every ten students currently smoke.[17] The issue of smoking among high school students has received little national attention and is limited to a few reports with inconsistent methodologies.[18–21] These reports have shown a variable prevalence of current smokers, ranging from 12.0% to 22.3% of high school students and 2.40% to 37.00% of university students.[17] To our knowledge, this study is the first to systematically address this health problem among high school students from the KSA by utilizing the GYTS. Al-Badah et al. utilized GYTS to address the smoking

Table 2: Characteristics of the 1269 students who participated in the study

| Characteristic                  | Male no. (%)† | Female no. (%)‡ | Total no. (%)§ |
|--------------------------------|---------------|-----------------|----------------|
| Gender                         |               |                 |                |
| Male                           | 599 (47.6)    | 658 (52.4)      | 1257 (100.0)   |
| Female                         | 658 (52.4)    | 599 (47.6)      | 1257 (100.0)   |
| School grade                   |               |                 |                |
| Grade 1                        | 195 (34.3)    | 221 (39.4)      | 416 (34.3)     |
| Grade 2                        | 210 (37.0)    | 203 (35.1)      | 413 (34.1)     |
| Grade 3                        | 163 (28.7)    | 220 (39.4)      | 383 (31.6)     |
| Geographical location          |               |                 |                |
| Northern part                  | 206 (34.1)    | 181 (26.2)      | 387 (30.6)     |
| Southern part                  | 134 (22.2)    | 128 (19.2)      | 262 (20.6)     |
| Eastern part                   | 120 (19.9)    | 235 (35.3)      | 355 (28.0)     |
| Western part                   | 144 (23.8)    | 121 (18.2)      | 265 (20.9)     |
| Type of the school             |               |                 |                |
| Governmental                   | 252 (41.7)    | 397 (59.6)      | 649 (51.1)     |
| Private                        | 352 (58.3)    | 268 (40.4)      | 620 (48.9)     |
| Cigarettes smoking status      |               |                 |                |
| Never smoked                   | 264 (43.6)    | 456 (66.7)      | 720 (56.7)     |
| Ever smoked                    | 341 (56.4)    | 208 (31.3)      | 549 (43.3)     |
| Current smoker                 | 186 (30.6)    | 59 (8.9)        | 245 (19.5)     |

†Percentage among male students, ‡Percentage among female students, §Percentage among all students
### Table 3: Characteristics of “ever smoked” vs “never smoked”

| Characteristics and attitudes | Never smoked no. (%) | Have ever smoked no. (%) | Total (N)% | \( P \) value |
|------------------------------|----------------------|--------------------------|------------|-------------|
| **Gender**                   |                      |                          |            |             |
| Male                         | 261 (36.5)           | 337 (62.4)               | 598 (47.7) | <0.0001     |
| Female                       | 453 (63.5)           | 204 (37.6)               | 657 (52.4) |             |
| Total                        | 715 (56.9)           | 542 (43.1)               | 1255 (100.0)|             |
| **Grade of student**         |                      |                          |            |             |
| Grade 1                      | 257 (37.5)           | 152 (28.6)               | 409 (34.1) | 0.0144      |
| Grade 2                      | 226 (33.0)           | 185 (36.0)               | 411 (34.3) |             |
| Grade 3                      | 202 (29.5)           | 177 (34.4)               | 379 (31.6) |             |
| Total                        | 685 (57.1)           | 514 (42.9)               | 1199 (100.0)|             |
| **Region of school**         |                      |                          |            |             |
| Northern                     | 214 (29.9)           | 167 (30.4)               | 381 (30.4) | 0.2315      |
| Eastern                      | 207 (29.0)           | 144 (26.2)               | 351 (28.0) |             |
| Western                      | 155 (21.7)           | 108 (19.6)               | 263 (21.0) |             |
| Southern                     | 139 (19.4)           | 131 (23.8)               | 260 (20.7) |             |
| Total                        | 715 (57.0)           | 540 (43.0)               | 1255 (100.0)|             |
| **Type of school**           |                      |                          |            |             |
| Government                   | 393 (55.0)           | 248 (45.9)               | 641 (51.1) | 0.0065      |
| Private                      | 322 (45.0)           | 292 (54.1)               | 614 (48.9) |             |
| Total                        | 715 (57.0)           | 540 (43.0)               | 1255 (100.0)|             |
| **Do your parents smoke cigarettes?** |            |                          |            |             |
| Neither of them              | 721 (74.3)           | 152 (63.6)               | 873 (72.2) | 0.0042      |
| Both                         | 7 (0.7)              | 6 (2.5)                  | 13 (1.1)   |             |
| Father only                  | 223 (23.0)           | 76 (31.8)                | 299 (24.7) |             |
| Mother only                  | 5 (0.5)              | 2 (0.8)                  | 7 (0.6)    |             |
| I do not know                | 15 (1.5)             | 3 (1.3)                  | 18 (1.5)   |             |
| Total                        | 971 (80.3)           | 239 (19.5)               | 1210 (100.0)|             |
| **Does anyone in your house other than parent smoke cigarettes?** | | | | |
| No                           | 676 (69.1)           | 124 (51.5)               | 800 (65.6) | <0.0001     |
| Yes                          | 302 (30.9)           | 117 (48.6)               | 419 (34.4) |             |
| Total                        | 978 (80.2)           | 241 (19.8)               | 1219 (100.0)|             |
| **Do any of your closest friends smoke cigarettes?** | | | | |
| None of them                 | 561 (57.5)           | 34 (14.2)                | 595 (49.0) | <0.0001     |
| Some of them                 | 327 (33.5)           | 114 (47.7)               | 441 (36.3) |             |
| Most of them                 | 65 (6.7)             | 63 (26.4)                | 128 (10.5) |             |
| All of them                  | 22 (2.3)             | 28 (11.7)                | 50 (4.1)   |             |
| Total                        | 975 (80.3)           | 239 (19.7)               | 1214 (100.0)|             |
| **If a best friend offered you a cigarette, would you smoke it?** | | | | |
| Definitely not               | 682 (70.2)           | 37 (15.5)                | 719 (59.4) | <0.0001     |
| Probably not                 | 132 (13.6)           | 36 (15.1)                | 168 (13.9) |             |
| Probably yes                 | 123 (12.7)           | 83 (34.7)                | 206 (17.0) |             |
| Definitely yes               | 34 (3.5)             | 83 (34.7)                | 117 (9.7)  |             |
| Total                        | 971 (80.3)           | 239 (19.8)               | 1210 (100.0)|             |
| **Refusal of selling cigarette due to age** | | | | |
| Did not buy cigarettes       | 948 (97.0)           | 53 (21.7)                | 1001 (82.0) | <0.0001 |
| Yes                          | 8 (0.8)              | 12 (4.9)                 | 20 (1.6)   |             |
| No, my age did not keep me  | 21 (2.2)             | 179 (73.4)               | 200 (16.4) |             |
| Total                        | 977 (80.00)          | 244 (20.0)               | 1221 (100.0)|             |
| **Do you think smoke from other people’s cigarettes is harmful?** | | | | |
| Definitely not               | 67 (6.9)             | 32 (13.6)                | 99 (8.2)   | 0.0002      |
| Probably not                 | 24 (2.5)             | 12 (5.1)                 | 36 (3.0)   |             |
| Probably yes                 | 208 (21.6)           | 65 (27.5)                | 273 (22.7) |             |
| Definitely yes               | 666 (69.0)           | 127 (53.8)               | 793 (66.0) |             |
| Total                        | 965 (80.4)           | 236 (19.7)               | 1201 (100.0) |     |

(Contd...)
prevalence among students aged 13 to 15 years and identified a prevalence of "ever smoked" of 26.1% (39.5% of the male students and 16.1% of the female students). Their data were reported from different parts of the KSA with the limitation that it did not differentiate between cities and did not clearly define what designated a student as a "current smoker" to allow comparison with our findings. A modified GYTS that was conducted at a university in Riyadh in 2009 showed the current smoking prevalence to be 14.5% (32.7% of the male students and 5.9% of the female students). These alarming figures reflect the tobacco industry’s focused advertising in developing countries that have not yet enacted strict antismoking policies.

Addressing a problem of this magnitude necessitates enhancing existing knowledge of the factors that predict smoking. Male gender was significantly associated with smoking. However, this strong association should not hide the fact that smoking is also prevalent among female students. This finding is supported by different studies and can be explained by societal restrictions on women, which may limit continual smoking but may not prevent them from occasionally trying...
Table 4: Factors associated with “ever smoked” status among high school students

| Characteristics and attitudes                                      | Smoking status |
|-------------------------------------------------------------------|----------------|
|                                                                   | Ever no. (%)* | Never no. (%)* | Odds ratio | Confidence interval |
| **Gender**                                                        |               |               |            |                    |
| Male                                                              | 338 (62.4)    | 261 (36.5)    | 2.88       | (2.28-3.63)        |
| Female                                                            | 204 (37.6)    | 454 (63.5)    |            |                    |
| **Parent smoking (Both or either)**                               |               |               |            |                    |
| Yes (Both or either)                                              | 84 (35.1)     | 235 (24.2)    | 1.70       | (1.25-2.30)        |
| No (Neither or do not know)                                       | 155 (64.9)    | 736 (75.8)    |            |                    |
| **Any smokers at home other than parents**                        |               |               |            |                    |
| Yes                                                               | 117 (48.5)    | 302 (30.9)    | 2.11       | (1.59-2.81)        |
| No                                                                | 124 (51.5)    | 676 (69.1)    |            |                    |
| **Smoking among closest friends**                                 |               |               |            |                    |
| Yes                                                               | 205 (85.8)    | 414 (42.5)    | 8.17       | (5.56-12.00)       |
| No                                                                | 34 (14.2)     | 561 (57.5)    |            |                    |
| **Offering of a cigarette from a friend**                         |               |               |            |                    |
| Yes (Definitely or probably)                                      | 166 (69.5)    | 157 (16.2)    | 17.46      | (11.59-26.27)      |
| No (Definitely or probably)                                       | 73 (30.5)     | 814 (83.8)    |            |                    |
| **Belief that passive smoking is harmful**                        |               |               |            |                    |
| Yes (Definitely or probably)                                      | 192 (81.4)    | 874 (90.6)    | 0.45       | (0.31-0.67)        |
| No (Definitely or probably)                                       | 44 (18.6)     | 91 (9.4)      |            |                    |
| **The belief that smoking is harmful**                            |               |               |            |                    |
| Yes (or probably)                                                 | 215 (91.1)    | 949 (97.9)    | 0.40       | (0.22-0.75)        |
| No (Definitely or probably)                                       | 21 (8.9)      | 20 (2.1)      |            |                    |
| **Refusal to sell cigarettes due to age**                         |               |               |            |                    |
| Yes                                                               | 12 (6.3)      | 8 (27.6)      | 5.68       | (2.09-15.48)       |
| No                                                                | 179 (93.7)    | 21 (72.4)     |            |                    |
| **Favoring banning smoking in public places**                     |               |               |            |                    |
| Yes                                                               | 137 (58.8)    | 780 (81.4)    | 3.07       | (2.26-4.18)        |
| No                                                                | 96 (41.2)     | 178 (18.6)    |            |                    |
| **It is safe to smoke for 1–2 years and quit**                    |               |               |            |                    |
| Yes (Definitely or probably)                                      | 103 (53.1)    | 406 (41.9)    | 1.57       | (1.15-2.14)        |
| No (Definitely or probably)                                       | 91 (46.9)     | 563 (58.1)    |            |                    |

*Percentage from the total each category

Thus, steps must be taken to reduce the impact of smoking on women’s health. Our findings also show that smoking prevalence significantly increased as high school students progressed in their studies. These findings, especially those reporting a significant association with the students’ grade, agree with a previous survey of medical students from Riyadh. This is supported by the finding that almost half of the students believed that they were taught about smoking dangers in their curricula. Our study is also consistent with a report from Lebanon and probably reflects the slow changes in the curricula as a shared concern in the region. Furthermore, the finding that the surveyed students believed that smoking was harmful and indicated a desire to quit smoking supports the importance of strengthening antismoking curricula in schools.

Although having either a parent, both or another household member who smokes was associated with smoking, a smoking parent was associated with a student being a “current smoker.” The strongest influencing factor for “ever smoked” status was related to friends who smoke or having been offered cigarettes. This finding is supported by previous literature from the KSA and the region. Studies from Pakistan and China also showed a strong peer effect of smoking, which may reflect the limited interaction between teenagers and their family. Lack of age restrictions for selling cigarettes was another factor associated with both “ever smoked” and “current smoking” status. This is despite the fact that the KSA has prohibited smoking in public places and has restricted tobacco sales to teenagers. Our finding is consistent with GYTS results from throughout the region, which showed that nine of ten students have bought cigarettes without restriction. Therefore, there is an immediate need to enforce these laws to protect the younger generations.

There are some limitations to this study. The first is related to the GYTS that inquired the reply for smoking at least one cigarette in the past 30 days. The CDC has defined current smoking to be a smoker of at least 100 cigarettes. Therefore, this may lead to overestimation of the prevalence of current smokers. Second, although the GYTS questionnaires were
Table 5: Factors associated with current smoking among high school students

| Characteristics and attitudes                      | Ever smokers | Non-current No. (%)* | Oddsratio | Confidence Interval |
|----------------------------------------------------|--------------|----------------------|-----------|---------------------|
| **Gender**                                         |              |                      |           |                     |
| Male                                               | 164 (13.1)   | 22 (1.8)             | 6.39      | (3.27-12.38)        |
| Female                                             | 34 (2.7)     | 29 (2.3)             |           |                     |
| **Parent smoking (Both or either)**                |              |                      |           |                     |
| Yes (Both or either)                               | 123 (10.2)   | 18 (1.5)             | 3.42      | (1.79-6.53)         |
| No (Neither or do not know)                        | 66 (5.5)     | 33 (2.7)             |           |                     |
| **Any smokers at home other than parents**         |              |                      |           |                     |
| Yes                                                 | 93 (7.6)     | 24 (2.0)             | 1.08      | (0.58-2.00)         |
| No                                                  | 97 (8.00)    | 27 (2.7)             |           |                     |
| **Smoking among closest friends**                  |              |                      |           |                     |
| Yes                                                 | 165 (13.6)   | 40 (3.3)             | 1.97      | (0.89-4.38)         |
| No                                                  | 23 (2.0)     | 11 (0.9)             |           |                     |
| **Offering of a cigarette from a friend**         |              |                      |           |                     |
| Yes (Definitely or probably)                       | 150 (12.4)   | 26 (2.2)             | 3.01      | (1.59-5.69)         |
| No (Definitely or probably)                        | 48 (4.0)     | 25 (2.1)             |           |                     |
| **Belief that passive smoking is harmful**         |              |                      |           |                     |
| Yes (Definitely or probably)                       | 106 (8.8)    | 41 (3.4)             | 0.66      | (0.29-1.50)         |
| No (Definitely or probably)                        | 35 (2.9)     | 9 (0.8)              |           |                     |
| **The belief that smoking is harmful**             |              |                      |           |                     |
| Yes (Definitely or probably)                       | 166 (13.8)   | 49 (4.1)             | 0.36      | (0.08-1.58)         |
| No (Definitely or probably)                        | 19 (1.6)     | 2 (0.2)              |           |                     |
| **Refusal to sell cigarettes due to age**          |              |                      |           |                     |
| Yes                                                 | 10 (0.8)     | 2 (0.2)              | 2.19      | (0.44-10.91)        |
| No                                                  | 164 (13.4)   | 15 (1.2)             |           |                     |
| **Favoring banning smoking in public places**      |              |                      |           |                     |
| Yes                                                 | 104 (8.7)    | 33 (2.8)             | 0.69      | (0.35-1.0)          |
| No                                                  | 79 (6.6)     | 17 (1.4)             |           |                     |
| **It is safe to smoke for 1–2 years and quit**     |              |                      |           |                     |
| Yes (Definitely or probably)                       | 103 (8.5)    | 29 (2.4)             | 0.9       | (0.48-1.71)         |
| No (Definitely or probably)                        | 82 (6.8)     | 21 (1.7)             |           |                     |

*Percentage from the total answered

Anonymous, it is expected that some students, especially females, may avoid revealing their smoking status.

In conclusion, having parents or friends who smoke is strongly and significantly associated with “ever smoked” and continual smoking. Although male gender and having a parent or friend who smokes have previously been considered to be predictive factors for smoking, this study showed that peer smoking and lack of restrictions for selling cigarettes to teenagers are the strongest predictive factors for smoking. A similar effect was observed for students who had smoked in the previous 30 days, with the strongest predictive factors being male gender, parental smoking, and friend smoking. These findings would necessitate increasing the awareness of banning smoking at home. Moreover, there is an immediate need to escalate health promotion campaigns regarding smoking and to enhance these opinions in the curricula by revisiting this issue frequently through a spiral approach. These steps may reduce the increased smoking prevalence observed as students’ progress in their level of education.

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