Impact of Smoking on Health-Related Quality of Life: A General Population Survey in West Iran

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Abstract

This study was aimed at assessing any association between smoking and health-related quality of life (HRQoL) among adults aged 18 years and above living in Kermanshah city, western Iran. A cross-sectional study was conducted on a total sample of 1,543 participants obtained by convenient sampling during the period from February 1st to May 30th, 2017. Data were collected using a self-administrated questionnaire. The HRQoL of the study participants was assessed with reference to the EuroQol 5-dimensions-3-level (EQ-5D-3L). The impact of smoking behavior of the participants on HRQoL with controls for potential confounders was examined by multiple regression. Out of the total of 1,543 participants, current smokers, past smokers, and never smokers accounted for 19.7%, 4.2% and 76.1%, respectively. The mean EQ-5D indices were 0.69 ±SD 0.20, 0.70 ± SD 0.22, and 0.78 ± SD 0.16. The highest proportion of self-reported problems (including both ‘some’ and ‘severe’) were related to current, heavy smokers, with high nicotine dependence. Regression analysis indicated that current smokers had a significantly lower HRQoL compared to past smokers and never smokers (p < 0.05). The heavy smokers also had a significantly lower HRQoL score than moderate and light smokers (p < 0.05) and there was an inverse relationship between the HRQoL score and nicotine dependence (p<0.05). The current smokers, heavy smokers, and high nicotine dependent smokers had lower HRQoL scores. These findings provide inputs for better understanding and for devising interventions for smoking cessation, reducing the number of cigarettes smoked per day and nicotine dependency.

Keywords: Health-related quality of life- smoking- adult, EQ-5D- Iran

Introduction

Cigarette smoking is one of the major public health concerns globally. Each year, more than five million adults die from condition related to smoking. The annual death rate is expected to rise to about 8 million people by the year 2030. More than 80% of these deaths will be in low- and middle-income countries (Max et al., 2004). Despite interventions to decrease smoking, the prevalence of smoking in Iran remained very high. The prevalence of male and female smokers were estimated at 23.4% and 1.4% respectively (Meyesame et al., 2010). Evidence from Iran and elsewhere indicated a negative impact of smoking including death, length of hospital stay (LHS) and costs of hospitalization (Rezaei et al., 2015; Rezaei et al., 2016a; Rezaei et al., 2016b; Akbari Sari et al., 2016).

The adverse effects of smoking on the health of individuals are commonly understood. While the impact of smoking on health-related quality of life (HRQoL) in the developed countries are well documented, the association between smoking behavior and HRQoL of individuals in the developing world is rarely reported (Coste et al., 2014; Strine et al., 2005; Vogl et al., 2012). An inverse association between HRQoL and the number of cigarettes smoked has been reported. However, there is no such an evidence from Iran in general and the western region of Iran in particular. The HRQoL, as a physical well-being of a person, is an important concept in health systems research (HSR) to inform decisions for improving the prevention and treatment of disorders (Stewart et al., 1995).

Determining the relationship between HRQoL and a particular lifestyle such as cigarette smoking needs inputs from economic evaluation studies for better informed decisions concerning the allocation of the limited resources in health systems. The knowledge on the lost utility due to smoking can also help design cost-effectiveness studies about smoking reduction and smoking cessation interventions among populations. Thus, the knowledge on the utility is an important input for the economic evaluation studies such as cost-utility analysis (Jia and Lubetkin, 2010; Stewart et al., 1995; Vogl et al., 2012;
Tillmann and Silcock, 1997). Despite well-established risk of poor health, to the best of our knowledge, there is no evidence showing the association between smoking and HRQoL among the general population in Iran. This study aims to identify the association between smoking and HRQoL and to examine the impact of smoking on health-related quality of life using the EQ-5D among 18 year old and above individuals living in Kermanshah city, western Iran.

Materials and Methods

Study population and sampling method

A cross-sectional study was carried out from February one to May 30, 2017 to examine the association between smoking and HRQoL among 18 year old and above individuals living in Kermanshah city, western Iran. A convenience sampling technique was used to select the study participants.

Data collection tools

The data was collected using a self-administered questionnaire consisting of three parts. The first part was related to socio-demographic characteristics, socio-economic status, and life style of the study participants. The second part was related to the smoking behavior (smoking status, smoking intensity and nicotine dependence) of the respondents. The Fagerstrom test with 6 questions was used to identify the level of nicotine dependence of the participants (Heatherton et al., 1991). The third part was administered the validated Iranian version of the EuroQol 5-dimensions-3-level (EQ-5D-3L) questionnaire that consisted of five dimensions (mobility, self-care, usual activity, pain/discomfort, and anxiety/depression) with three response levels (no problem, some problem and extreme problem) for each dimension (Rabin and Charro, 2001). We used the Iranian value set for the EQ-5D-3L health states, which was calculated by the visual analog score to compute the HRQoL of the study participants. This method was suggested for use in a recent study conducted by Goudarzi et al. (Goudarzi et al., 2016).

Statistical analysis

Based on their smoking status, we classified the participants into current smokers (those who smoke at least one piece of cigarette per day), never smokers (those who have never had smoked or smoked less than 100 pieces of cigarettes in their lifetime), and past smokers (those who have had smoked regularly or occasionally in the past). Again, based on the frequency of cigarette smoking per day, the current smokers were further classified into light smokers (those who smoke less than 10 pieces of cigarettes per day), moderate smokers (those who smoke between 10 and 19 pieces of cigarettes per day), and heavy smokers (those who smoke 20 or more pieces of cigarette per day). The nicotine dependence of the smokers was also classified as low dependence (score 1-2), medium dependence (score 3-7), and high dependence (score 8+).

The descriptive statistics based on the five dimensions of the EQ-5D for the different smoking behaviors of the participants are presented in Table 2 and Figure 1. Among the current smokers, anxiety/depression (51.6%), pain/discomfort (51.6%), usual-activities (28.7%), mobility problems (19.5%) and problems of self-care (17.2%) were the highest proportions of the reported problems (both ‘some’ and ‘severe’) across the five dimensions of the EQ-5D. Compared to the never smokers, those who reported having the problems were higher in proportion than those of the current and past smokers. Based on the intensity of smoking, anxiety/depression (40.5%), pain/discomfort (39.2%), usual-activities (37.8%), problems...
The proportions of those who reported ‘some’ or ‘severe’ problems across the five dimensions were higher for the light smokers than that of the heavy and moderate smokers. However, in none of the participants were ‘severe’ mobility, problem of self-care and usual activities problems reported (see Table 2).

The means of the EQ-5D index for the different smoking behavior and the multiple linear regression results are shown in Table 3. The overall mean of the EQ-5D was 0.76 ±SD 0.18. The mean EQ-5D index for the current, past smokers, and never smokers were 0.69 ± 0.20, 0.70 ± 0.22 and 0.78 ± 0.16, respectively. The multiple regression analysis indicated that the current smokers had significantly lower HRQoL compared to the past and never smokers. Again, the past smokers had better HRQoL compared to the current smokers. Among the current smokers, the heavy smokers (those who smoke 20 and over pieces of cigarettes per day) had significantly lower HRQoL scores than those of the moderate smokers (those who smoke 11-20 pieces of cigarettes per day) and the light smokers (those who smoke 0-10 pieces of cigarettes per day). The HRQoL score for light smokers was significantly higher when compared to the HRQoL score of the moderate smokers. However, the regression analysis revealed an inverse relationship between the HRQoL scores and the nicotine dependence of the smokers. The smokers with high nicotine dependence had lower HRQoL score compared to those with medium, low and no nicotine dependence.

Table 1. Socio-Demographic Characteristics, Socioeconomic Status and Life Style Factors of The Study Participants in Kermanshah, Western Iran, 2017

| Variables                                      | Frequency | Percent |
|------------------------------------------------|-----------|---------|
| Age group                                      |           |         |
| 18-44 years                                    | 1,066     | 69.5    |
| ≥ 45 years                                     | 468       | 30.5    |
| Sex                                            |           |         |
| Male                                           | 873       | 56.9    |
| Female                                         | 661       | 43.1    |
| Marital status                                 |           |         |
| Never married                                  | 70        | 4.6     |
| Married                                        | 835       | 54.4    |
| Divorced and widowed                           | 629       | 41.0    |
| Monthly household income per capita (Iranian Rials) | |         |
| Low (<10 million)                              | 840       | 54.8    |
| Middle (10 - 20 million)                       | 606       | 39.5    |
| High (> 2 million)                             | 88        | 5.7     |
| Educational level                              |           |         |
| Illiterate                                     | 88        | 5.7     |
| Primary and secondary                          | 641       | 41.8    |
| Post-secondary                                 | 805       | 52.5    |
| Health insurance                               |           |         |
| Yes                                            | 1,301     | 84.8    |
| No                                             | 233       | 15.2    |
| Smoking behavior                               |           |         |
| Current smoker                                 | 303       | 19.7    |
| Past smoker                                    | 64        | 4.2     |
| Never smoker                                   | 1167      | 76.1    |
| Smoking intensity                              |           |         |
| Light smoker                                    | 83        | 27.4    |
| Moderate smoker                                | 146       | 48.2    |
| Heavy smoker                                   | 74        | 24.4    |
| Nicotine dependence                            |           |         |
| No dependence (non-smoker)                     | 1,231     | 80.2    |
| Low dependence                                 | 160       | 10.4    |
| Middle dependence                              | 100       | 6.5     |
| High dependence                                | 43        | 2.8     |
| Physical activity                              |           |         |
| Active                                         | 878       | 57.4    |
| Moderately active                              | 443       | 28.9    |
| Inactive                                       | 210       | 13.7    |
| Body mass index (BMI)                          |           |         |
| Normal                                         | 846       | 55.2    |
| Overweight /obese                              | 688       | 44.8    |
| Chronic diseases                               |           |         |
| Yes                                            | 182       | 11.9    |
| No                                             | 1,352     | 88.1    |

* One US Dollar, 35,000 Iranian Rials (IR) in 2017.

of self-care (39.2%) and mobility problems (33.8%) were the highest percentages reported among the heavy smokers. The proportions of those who reported ‘some’ or ‘severe’ problems across the five dimensions were higher for the light smokers than that of the heavy and moderate smokers. However, in none of the participants were ‘severe’ mobility, problem of self-care and usual activities problems reported (see Table 2).

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Figure 1. Percentage Distribution of Reported Problems (‘some’ or ‘severe’) among Adult Population by Smoking Status: (A) smoking intensity, (B) nicotine dependence and (C) the study participants in Kermanshah, western Iran, 2017
Discussion

This study attempted to investigate the HRQoL of smokers and non-smokers and the relationship between smoking behavior (never, current and past smoker), smoking intensity (light, moderate and heavy smoker), nicotine dependence (no, low, medium and high dependence) and HRQoL of adult smokers among the people living in west Iran. The findings showed negative association between smoking behavior and HRQoL. Those never smokers had higher scores of HRQoL and reported lower problems in the EQ-5D dimensions. In contrast, the heavy smokers had lower HRQoL than the light and moderate smokers. The higher nicotine dependency of the smokers was correlated with a lower HRQoL scores.

Previous study in Iran reported that smokers had significantly lower quality of life in the physical, psychological, social and environmental dimensions of health (Khalilzad Behrozian and Ahmadi, 2013). Similarly, our findings indicated that anxiety/depression was more prevalent among the current smokers than the never and past smokers. Others also found that psychological problems such as depression were more prevalent among current smokers than former smokers and never smokers (Brown et al., 1996; Rathnayaka et al., 2014; Talati et al., 2016). Evidence from a systematic review and meta-analysis also indicated that smoking

Table 2. Responses of Participants to the Five Dimensions of the EQ-5D by Smoking Behavior of the Study Participants in Kermanshah, Western Iran, 2017

| EQ-5D dimensions | Level (problem) | Smoking status | Smoking intensity | Nicotine dependence |
|------------------|----------------|----------------|-------------------|---------------------|
|                  |                | Never | Past | Current | Light | Moderate | Heavy | No | low | Middle | High |
| Mobility         | No             | 89.2  | 93.7 | 80.5    | 86.8  | 84.3     | 66.2  | 89.4| 88.8| 79    | 53.5 |
|                  | Some           | 10.8  | 6.3  | 19.5    | 13.2  | 15.7     | 33.8  | 10.6| 11.2| 21    | 46.5 |
|                  | Severe         | 0     | 0    | 0       | 0     | 0        | 0     | 0   | 0   | 0     | 0    |
|                  |                | 96.2  | 89   | 82.8    | 91.8  | 86.7     | 60.8  | 95.9| 90.6| 86    | 46.5 |
| Self-care        | No             | 3.8   | 11   | 17.2    | 8.2   | 13.3     | 39.2  | 4.1 | 9.4 | 14    | 53.5 |
|                  | Severe         | 0     | 0    | 0       | 0     | 0        | 0     | 0   | 0   | 0     | 0    |
|                  |                | 88.3  | 71.9 | 71.3    | 79.5  | 71.2     | 62.2  | 87.5| 81.2| 68    | 41.9 |
| Usual activities | No             | 11.7  | 28.1 | 28.7    | 20.5  | 28.8     | 37.8  | 12.5| 18.8| 32    | 58.1 |
|                  | Severe         | 0     | 0    | 0       | 0     | 0        | 0     | 0   | 0   | 0     | 0    |
|                  |                | 71.9  | 64.4 | 48.4    | 67.1  | 62.7     | 60.8  | 70.1| 70.2| 63    | 48   |
| Pain/discomfort  | No             | 27.4  | 34.6 | 50      | 50.1  | 36.1     | 39.2  | 28.7| 28.8| 37    | 51   |
|                  | Severe         | 0.7   | 1    | 1.6     | 1.4   | 1.2      | 0     | 0   | 0   | 0     | 0    |
| Anxiety/depression| No          | 69.2  | 61.1 | 48.4    | 67.3  | 57.8     | 59.5  | 68.1| 65  | 61    | 46.5 |
|                  | Severe         | 1.1   | 2.7  | 6.3     | 2.7   | 2.4      | 2.7   | 1.4 | 3.1 | 2     | 2.3  |

All numbers are in percentage.

Table 3. Multiple Linear Regression of the Association between Different Smoking Behavior and EQ-5D Index Study Participants in Kermanshah, Western Iran, 2017

| Smoking status  | Mean EQ-5D index±SD | Coefficient | EQ-5D index | P-value | 95 % confidence interval |
|-----------------|---------------------|-------------|-------------|---------|--------------------------|
| Never smoker    | 0.78 ± 0.16         | Reference   | -           | -       | -                       |
| Past smoker     | 0.70 ± 0.22         | -0.057      | 0           | -0.079 to -0.035         |
| Current smoker  | 0.69 ± 0.20         | -0.065      | 0.001       | -0.105 to -0.025         |
| Smoking intensityb | 0.62 ± 0.28        | Reference   | -           | -       | -                       |
| Heavy smoker    | 0.72 ± 0.20         | 0.067       | 0.031       | 0.006 to 0.127           |
| Moderate smoker | 0.73 ± 0.20         | 0.074       | 0.005       | 0.022 to 0.127           |
| Nicotine dependencyc | 0.77 ± 0.16    | Reference   | -           | -       | -                       |
| No dependence   | 0.75 ± 0.19         | -0.027      | 0.05        | -0.053 to 0.0004         |
| Low             | 0.70 ± 0.22         | -0.047      | 0.006       | -0.079 to -0.014         |
| Middle          | 0.52 ± 0.26         | -0.17       | 0           | -0.221 to -0.121         |

Adjusted for age, gender, physical activity, marital status, chronic diseases, income, health insurance, educational level, BMI. *, Adj R-squared is 0.29; +, Adj R-squared is 0.39; - Adj R-squared is 0.30.
cessation improved mental health and quality of life of the quitters. Beside, smoking cessation was correlated with reduction in depression, stress and anxiety problems (Taylor et al., 2014). Despite the higher rate of smoking among people with mental illness, providing appropriate treatment for mentally ill smokers can increase their chance of smoking cessation (Lê Cook et al., 2014).

Our findings indicated an association between smoking and lower HRQoL among adult individuals living in Kermanshah province. An earlier study in the same province reported the absence of a significant effect of smoking on quality of life among patients with hemodialysis (Omrami et al., 2013). However, evidence showed that patients undergoing hemodialysis are more likely to have poor quality of life compared to the general population (Fukuhara et al., 2003; Pakpour et al., 2010). A study on HRQoL among water pipe smokers in south Iran found that smoking decreases the physical and mental dimensions of quality of life. Beside, smoking water pipe, being female, older age, and lower education level were associated with increased risk of poor HRQoL (Tavafian et al., 2009). Another study in Iraq also reported that water pipe smokers were in a poorer physical and mental quality of life than the non-smokers. The age, education status, cigarette smoking status, disease status and water pipe use were correlated with the physical and mental health scores among the water pipe smokers (Al-Easawi et al., 2014).

The mean score of the EQ-5D in our study (0.76) is consistent with the report of a similar study in Tehran (0.74). Pain/discomfort and anxiety/depression were the most prevalent problems reported and smoking was negatively associated with HRQoL (Kazemi Karyani et al., 2016). The most frequently reported problems “both some and extreme” among the Iranian population were pain/discomfort and anxiety/depression dimensions of the EQ-5D (Javanbakht et al., 2012). These EQ-5D dimensions exert most of the weights on the Iranian value-set (Goudarzi et al., 2016). Thus, paying attention to the HRQoL dimensions can lead to improved HRQoL. The mean values of the HRQoL reported from developed countries such as Sweden (Burström et al., 2001a), U.S. (Luo et al., 2005), Italy (Scalone et al., 2015) and Japan (Shiroiwa et al., 2015) were higher than that reported from Iran. Nevertheless, the problems of mobility, self-care, and usual activity were the least prevalent problems both in the developed and developing countries including Iran (Burström et al., 2001a; Kazemi Karyani et al., 2016; Mccaffrey et al., 2016; Scalone et al., 2015).

Several studies reported that socio-demographic characteristics, socioeconomic status and health status (chronic diseases) of the study participants were among the main determinants of the HRQoL in different populations (Burström et al., 2001b; Kazemi Karyani et al., 2016; Luo et al., 2005). Our analysis adjusted for these determinants to identify the pure effect of smoking on HRQoL. By controlling for the socio-economic differences of the study participants, our analysis revealed that smoking and nicotine dependency significantly decreased the HRQoL. Evidence from a related study that adjusted the study participants for socioeconomic status also reported the negative effect of nicotine dependency on HRQoL and the smokers with nicotine dependence had a higher risk of developing mental disorders (Schmitz et al., 2003). Nonetheless, the difference in socio-demographic characteristics might be explained by the high rate of mental disorders and poor health status among the smokers than the non-smokers (Son et al., 1997), and the improvement in quality of life after smoking cessation could also be explained by the socio-economic status of the people (Tillmann and Silcock, 1997).

Generally, several studies highlighted that smokers have lower quality of life than non-smokers. Heavy smokers have lower level of HRQoL than the light smokers, ex-smokers and never smokers (Strine et al., 2005; Wilson et al., 1999). The smokers are more likely to drink alcohol and to report sleep disorders, symptoms of anxiety and depression than the non-smokers. Besides, smokers are more likely to be inactive, have pain and unhealthy diet than the non-smokers (Strine et al., 2005). A cohort study demonstrated that never-smokers had the highest scores on health status and they have longer life than the smokers. There was a big difference between never smokers and heavy smokers in their health status and longevity (Strandberg et al., 2008).

The consideration of smoking alone in the investigation of the effect of smoking on health may provide misleading results concerning the evaluation of tobacco and smoking cessation programs (Breslau et al., 2001; Schmitz et al., 2003). Our study included nicotine dependence to declare the association between HRQoL and nicotine dependence. A high nicotine dependence could resulted in low HRQoL, while decreasing the nicotine dependence can be considered successful in the smoking cessation programs. The EQ-5D value-set for the Iranian population was used to increase the validity of the study. The different categories of smoking status were considered to better understand the association between smoking and HRQoL among the participants. Nevertheless, our study has several limitations. First, the fact that our study was based on convenience sampling, the interpretation of the findings should be with caution. Second, the cross-sectional design study could not let the authors to investigate causal relationship between smoking and HRQoL of the participants. Third, the study participants were included only from only one province in Iran, Kermanshah. Hence, the findings cannot be generalizable to other provinces in Iran. Fourth, this study measured the smoking behavior, smoking intensity and nicotine dependence of the participants. Therefore, there could be a possible of recall bias in measuring the items. Taking into account the differences in socio-demographic and smoking behaviors of the people living different in the different provinces of Iran, future studies can provide useful understanding about the HRQoL and smoking in the different provinces in Iran.

In conclusion, the findings indicated that current smokers had lower HRQoL than past and never smokers. The nicotine dependence was inversely associated with HRQoL of the study participants. Thus, smoking cessation programs should emphasize on individuals with high nicotine dependence and decreasing the nicotine dependence can be considered as a part of an
effective smoking cessation intervention of the programs. Improving the HRQoL of smokers can encourage the development of public smoking cessation programs.

Conflict of Interest
The authors declare that they have no conflict of interest associated with the material presented in this paper.

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