Perceived Effectiveness of Pictorial versus Textual Health Warning Labels on Waterpipe Tobacco Packages

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Abstract: It is known that pictorial Health Warning Labels (HWLs) on cigarette packages outperform text-only HWLs on a range of outcomes; nothing is known about waterpipe in this regard. The primary objective of this study was to evaluate the perceived effectiveness of shocking pictures versus textual HWLs in Lebanon on quitting waterpipe smoking and on reducing the number of waterpipe smoked weekly; a secondary objective was to assess waterpipe smoking cessation motivation factors. Two different types of warnings were shown to the smokers during the interview: only text versus graphic warnings on waterpipe tumbac packages. The group more motivated to stop smoking considered that the warnings with graphic shocking images have significantly greater effect than simple text currently used (84%, p=0.001). Furthermore, we noticed that quitting the waterpipe smoking and the perception of shocking pictures are inversely influenced by most of the chronic health symptoms (OR <1). Indeed, smokers who had chronic cough are highly motivated to quit waterpipe smoking (OR =7.24, p=0.03). Thus, our study provides further reasons to the policymakers in Lebanon to incorporate more tobacco labeling policies in order to reduce the widespread of waterpipe smoking.

Keywords: Waterpipe smoking, shisha, narghile, hookah, adult smokers, health warnings, tobacco packaging, tumbac packages, graphic warning labels, textual warning labels.

1. Introduction
Waterpipe tobacco smoking (WTS) is an emerging trend worldwide [1]. In the WHO Eastern Mediterranean Region, waterpipe use has exceeded cigarette use in some countries [2]. Misperceived as less harmful than cigarette smoking, every study to date has found that waterpipe tobacco smoke contains extensive quantities of the toxicants admitted to cause diseases in cigarette smokers, including cancer [3]. Various carcinogens and toxicants have been pinpointed. It was demonstrated that one WTS session consistently exposes users to higher levels of tobacco toxicants “nicotine, tar, and CO” compared to one cigarette [4]. Accordingly, waterpipe use has damaging effects on the respiratory system [5], cardiovascular system [5], and long-term waterpipe smokers have higher incidences of chronic obstructive pulmonary disease (COPD) and periodontal disease [2,6]. Moreover, chronic cough and phlegm are important indicators of respiratory morbidity [7] with significant association of these symptoms with mortality due to respiratory diseases such as (COPD) [8]. It has been demonstrated that these chronic symptoms motivated cigarette smokers to quit smoking because they were afraid of getting sick in the future [9]. Even light-use waterpipe only smokers have more cough and sputum, lower lung diffusion capacity, abnormalities in multiple lung related biologic and clinical parameters [10].

Regarding the regulations and the relative success of public health policies in reducing cigarette smoking in many countries, waterpipe smoking has been floating in rigorous tobacco control policies
and regulations that are mostly cigarette-oriented. The lack of execution of relevant tobacco control policies is the main problem in developing countries and has contributed to the propagation of waterpipe products [11,12]. Many policy-related elements must be waterpipe-specific [13]. In fact waterpipe devices differ from cigarettes because they vary in shape and size, are less portable, comprise multiple parts, are often shared and involve diverse commercial stakeholders. All of the above provide ample justification for vigorous research on methods for preventing and treating the widespread use of waterpipe tobacco smoking [1]. Although most price-based policies have been efficient in reducing the demand for cigarettes [14,15], raising the price of waterpipe tobacco might not have the same effect [11]. Waterpipe smokers may be less susceptible to price than cigarette smokers [16].

Even if cigarette pack size and packaging are quite uniform worldwide, this is not the case for waterpipe. Indeed for centuries, the tobacco industry has taken advantage of the package as a setting for creating positive associations for their product [1]. Therefore, replacing those positive associations with negative associations by using shocking graphic pictures could be a powerful technique to convey the devastating impact of tobacco products on global health, in several low- and middle-income countries in particular. Although experimental work is limited, evidence suggests that pictorial HWLs on cigarette packages outperform text-only HWLs on a range of outcomes, including increasing awareness of health risks [17], perceived effectiveness [18,19], negative effect [20], and motivation to quit [17,20,21].

As for waterpipe, the research literature on the effectiveness of health warnings on waterpipe tobacco warnings is sparse. There is a need to do a pre-market testing of warning label placement on tumbac packages that would be useful to reduce the widespread of waterpipe smoking. Therefore, our primary objective is to report on the perceived effectiveness of health warnings on waterpipe tobacco packages and to evaluate the impact of shocking pictures versus textual health warnings in Lebanon on quitting tobacco-smoking or on reducing the number of waterpipe smoked weekly; our secondary objective is to assess the motivation factors to quit waterpipe smoking.

2. Methods

Study design and ethics
We performed a cross-sectional study between March 2013 and April 2015. It was conducted in 5 outpatient clinics in Lebanon: 2 in Beirut, 1 in Mount Lebanon and 2 in North of Lebanon and included waterpipe adult smokers age ≥ 18 years. The Lebanese University waived approval of the study since it is an observational non-invasive study that respects participants’ autonomy and anonymity; the study followed principles of the Declaration of Helsinki for such types of studies [22].

Study participants
Individuals were invited to complete a standardized questionnaire (in arabic) in the waiting rooms of respiratory outpatient clinics and/or in the waiting rooms of a smoking cessation center located in one hospital in Beirut. The individuals were patients coming to the clinic for an ordinary checkup, for an acute respiratory disease such as a pneumonia or acute bronchitis or for a chronic respiratory disease; they had to be exclusive current waterpipe smokers. Healthy individuals were also included, provided they were current waterpipe smokers “defined as currently smoking ≥1 WP per week”. In addition, they could be seeking an advice for a smoking cessation program. The interview was carried out by trained pharmacists and nurses. A verbal consent in Arabic was given by participants in order to be included in the study.

Study tool and variables
A questionnaire using questions from the standardized questionnaire of the American Thoracic Society was given to all participants [23]. The questionnaires were administered in Arabic local language; details about the translation process were presented in a study conducted by Waked et al. 2009 [24]. Socio-demographic characteristics such as age (categorized < 45 years and ≥ 45 years) and gender were recorded. Chronic respiratory problems were assessed, using the following definitions: “chronic respiratory disease declared by a doctor, chronic cough, chronic phlegm, cough and phlegm for more than 3 months per year since 2 years, cough and phlegm for more than 3 weeks, and chronic wheezing.”

Waterpipe smoking behavior was assessed by “the number of waterpipe smoked per week and the number of years of smoking waterpipe”. For the number of waterpipe smoked per week, responses were categorized into 1 to 2, 3 to 6 and >7 waterpipe per week. The number of years of smoking for each participant was categorized into <6, 6 to 15, 16 to 25 and >25 years of smoking. Waterpipe smoking dependence was assessed using the Lebanon Waterpipe Dependence scale – 11 (LWDS11); it was categorized into <10 “low dependency” and >10 “high dependency” [25]. The packaging perception was assessed by the appreciation of the tumbac packaging (moistened
raw tobacco) warning labels and their perceived effectiveness on smoking cessation or reduction. Two different warnings were shown to the smokers during the interview:

- Only text (current warning used in Lebanon, i.e. smoking kills, smoking leads to impotence, smoking causes cancer of the mouth and throat……); (Figure 1) followed by:
- Pictorial “shocking” warnings (i.e., diseased lungs, throat cancer, and rotting teeth). (Figure 1)

And we investigated the actual effect of textual warnings on quitting smoking for at least one month during the last year and the reduced amount of waterpipe smoked weekly due to these warnings; by asking two questions:

- “Have you ever stopped smoking due to the textual warnings for at least one month?”
- “Are you or have you been influenced by the health warnings (reduction of the number of wp smoked weekly)?”

To quantify the hypothetical effect of the pictorial shocking warnings, two questions were asked.

- “If shocking images were used on tobacco boxes “tumbac”, would they have greater effect than simple warning text currently used? Yes/no;
- “If your favorite tumbac brand decides to change his look using these pictorial warnings on tobacco packaging, would you think of buying another tumbac brand?” Yes/no;

Finally, the motivation to quit smoking was measured by Mondor scale, categorized into ≤12 “low motivation to quit” and >12 “high motivation to quit” [26].

### Sample calculation
Sample size calculation was performed using Epi-info with a confidence level of 95% and a precision of 5%. The mean percentage of Lebanese who smoke and could theoretically be exposed to WP is around 50% [27]; in an Italian study done on cigarette smoking, they found that 6% of responders referred that they stopped smoking at least one month due to the textual warnings [28]; thus, we expected around 9% of the population of WP to stop smoking for at least one month during the last year due to the textual warning on tumbac packages. Therefore, we needed a sample of 126WP smokers.

### Statistical Analysis
The statistical analysis was performed using SPSS software, V.19.0. Categorical data were shown as absolute frequencies and percentages. Continuous data were presented as median (IQR=[P25-P75]). The nicotine dependence, motivation to stop smoking, gender and age groups were compared using the chi-square test. The following two logistic multivariable regression models were computed using as outcome the two questions concerning the impact of the graphic warnings. The independent factors included in the models were the following variables: gender, age groups (<45 years), nicotine dependence (high/low), and motivation to stop smoking (high/low).

In addition, a logistic multivariable regression was performed using as outcome the motivation scale; we took as independent variables: gender, age groups, nicotine dependence, chronic cough and cough & expectoration for more than 3 weeks. The ORs adjusted for the covariates with their CI95% were indicated. The Hosmer and Lemeshow test was applied to estimate the goodness of fit for each model. The statistical significance was set at \( P<0.05 \).

### 3. Results

### Sample description
Socio-demographic characteristics of individuals are presented in table 1. Among the one hundred twenty seven included in the study (median age=30 years (IQR=[23-40]) [range of age: 18-65] with 86.6% (n=110) were < 45 years old, 55.1% females; 5 years (IQR=[3-14]) was the median duration of tobacco use; 29.9% of the participants smoked 1-2 waterpipe per week, 22.8% smoked 3-6 waterpipe per week, and 47.2% more than 7 waterpipe per week. Moreover, 40.9% of smokers had a high motivation to quit (Mondor’s score >12) and 55.1% high nicotine dependence (LWDS11 >10).

91.3% of participants were aware of health consequences of tobacco smoking. Regarding the short term effects of waterpipe tobacco consumption, breathlessness (63.8%), yellow teeth (55.9%), bad breath (52.8%) and bad smelling clothes (51.2%) were the major worries mentioned by participants. (table 1)

### labels perceived effects
Among waterpipe smokers, 10.2% declared that they had stopped smoking during the last year for at least one month due to the actual warnings; 15% have been influenced by the textual health warnings on tumbac packages by a reduction of the
already used, (54.4% versus 36.8%, p=0.06) for at least one month due to the textual warnings dependence versus highly dependent, (15.8% versus 50.7%, p<0.001). The most highlighted consequence in simple text currently used (84% versus 56%, significantly greater hypothetical effect than the text-only warnings. Thus, when asked to choose between text-only warnings and shocking warnings, shocking pictures were hypothetically the most preferred (55.1%). Furthermore, 52% of the participants were willing to change from their favorite brand of tobacco if shocking pictorial warnings, showing the smoking health damages, were placed on their packages. (Table 1)

Moreover, 66.1% of the smokers mentioned that the warnings with shocking pictures could have more influence in reducing/ quitting waterpipe consumption than text-only warnings. This, when compared to the textual warnings and shocking warnings, shocking pictures were hypothetically the most preferred (55.1%). Furthermore, 52% of the participants were willing to change from their favorite brand of tobacco if shocking pictorial warnings, showing the smoking health damages, were placed on their packages. (Table 1)

The comparison by gender and age groups shows no statistically significant differences (Table 2). Yet women seemed to be more sensitive to pictorial warnings than males (73.9% versus 58.9%, p=0.07). On the other hand, young age group showed a higher worry for yellow fingernails (25.9% versus 5.9%, p=0.07).

**Weekly number of waterpipe smoked. Additionally, 44.1% of the sample considered very important to report health warnings about waterpipe consumption on tobacco packages; in addition a very high percentage of smokers referred that the actual health warnings didn’t increase their curiosity or their desire to be better informed or to be helped to give up smoking (62.2%). (Table 1)**

Furthermore, waterpipe smokers considered that the warnings with graphic shocking images have significantly greater hypothetical effect than the simple text currently used (84% versus 56%, p=0.001). The most highlighted consequence in highly motivated groups is breathlessness (86% versus 50.7%, p<0.001).

Looking at the subgroup of low nicotine dependence versus highly dependent, (15.8% versus 5.9%, p=0.07) have ever stopped smoking for at least one month due to the textual warnings already used, (54.4% versus 36.8%, p=0.06) considered extremely important to report warnings on packs, and (75.4% versus 60.3%, p=0.07) revealed the warnings with shocking pictures have hypothetically greater effect than text only. (Table 3)

**Effects of Chronic Respiratory Symptoms**

The comparison of the chronic health symptoms (Table 4) by the motivation to quit, the effect of shocking images/textual warnings on tobacco packages and the switching of the favorite tumbac brand showed no statistically significant difference except for the chronic cough (OR=4.76, p=0.04) and cough & expectoration for more than 3 months per year since 2 years (OR=0.12, P=0.02). Furthermore, we noticed the unimportance of the chronic symptoms in giving up the waterpipe smoking (OR<1) and in the perception of shocking pictures in most of the chronic symptoms (Table 4).

**Multivariable analysis**

Table 5 shows the multivariable logistics analysis; it demonstrated a significant higher hypothetical effect of the shocking pictures warnings in higher motivated smokers (OR=4.47, p=0.001), and showed a higher effect in females (OR=2.19, p=0.06) that tends to significance. Concerning switching from the favorite tumbac pack to other brand, there was a higher intention to change in highly motivated smokers (OR=2.76, p=0.008). Table 6 shows the multivariate logistics analysis of Mondor scale; it indicated a higher motivation to quit waterpipe smoking among smokers who had chronic cough (OR=7.24, p=0.03).

**4. Discussion**

The results from this study demonstrate a link between the use of shocking pictures on tumbac packages and the possibility of future attempts to reduce/quit smoking. Similar association between pictorial warnings on cigarettes packs and quitting smoking has also been demonstrated. In Australia, 62% of quitters reported in 2008 that the pictorial warnings had helped them to give up smoking [29]. Similarly, after the implementation of graphic warnings in 2006 in Thailand, the percentage of Thai smokers saying that labels made them more likely to quit cigarettes increased [30]. Thus, established evidence that pictorial health warnings on cigarette packages increase awareness of health risks among smokers and non-smokers more than textual warnings and decrease consumption [31] outlines the need to include pictorial health warnings on waterpipe tobacco products and accessories [32]. It is likely because they are more emotionally arousing and present the harms of smoking in vivid and memorable ways [30].
In our study waterpipe smokers are more negatively affected by shocking pictures than textual-health warnings currently used (66.1%). Indeed, it has been proven in several studies on cigarette smokers [29, 33-38]; In Australia, 75% of smokers reported the pictorial warnings had an effect on their behavior, a significant increase from the 25% who reported an effect from textual warnings eight years earlier [29]. Furthermore, more than 90% of Canadian admitted pictorial warnings on cigarette packages provided them with relevant information about the health effects of smoking and made smoking less attractive [33]. Indeed, a Canadian study found that approximately half of the smokers reported at least some fear, disgust, anger and subsequently an increase in cessation behavior in response to the pictorial health warnings [34]. Likewise, studies in France [35], Belgium [36], Spain [37], and the UK [38] consistently demonstrated that warnings with shocking pictures (such as rotten teeth or throat cancer) were rated as the most effective.

The present study showed that respondents who were more motivated to quit and who were exposed to pictorial warnings pointed out the vision that they would think of changing their favorite tumbac brand if the company decided to change the look of the boxes to include shocking images on smoking-related health damage (62% vs 37.3%, p=0.007). This might be due to the impact of pictorial warnings on the package displays in retail outlets. According to several studies [33, 35, 39-44], the implementation of shocking images have the potential to undermine a brand’s appeal and the impact of package displays at retail outlets. Additionally, in accordance with numerous studies [28, 45, 46], we showed that higher motivated smokers considered the pictorial warnings more impressive than text-only warnings (84% vs 56%, p=0.001). As a deduction, the pictorial warnings could be used on waterpipe tumbac packages and be hypothetically efficient in helping people to quit; consequently they should be more extensively approved by society instead of textual warning in order to support those who are more motivated to quit tobacco smoking.

In our study, around 10% of smokers claimed that they stopped waterpipe smoking for at least one month during their lifetime, while in the lower dependent (15.8% p=0.07) and higher motivated group (18% p=0.02), the percentage of quitting increased by more than 50%. On the other hand, approximately 44% of smokers considered actual health warnings on tobacco packages to be very important, although in the lower dependent and higher motivated group, the proportion increased to (62% p=0.01) and (54% p=0.06) respectively. These results were similar to a cross-sectional study conducted in Italy, which found that reporting health warnings on cigarettes packaging was considered highly essential in the subgroup of highly motivated smokers [28]. Although all warnings are subject to “wear out” over time, previous research suggests that larger pictorial warnings sustain their effect longer [48]. Thus, this later could be extended to waterpipe tumbac packages and contribute in guiding motivated and lower dependent waterpipe smokers to quit smoking.

Levels of theoretically perceived effectiveness of pictorial health warnings versus textual warnings have been found to be higher among low dependent smokers (75.4% vs 60.3%, p=0.07). This is consistent with a study done in Europe, which found that among dependent and more committed cigarette smokers, the level of perceiving effectiveness of health warnings is very low [40].

Concerning the typology of warning labels on tobacco packs, the LWDS11 scale and the Mondor scale do not correlate with the selection of the best type of warning as being more effective in helping to stop smoking. Oppositely, an Italian research showed that highly motivated smokers chose the association of pictorial and textual warnings in helping to quit smoking. However the Fagerstrom scale in this population doesn’t highlight any differences in the choice of the best type of warning to repress tobacco consumption [28]. Considering the choice of the type of warnings is associated with the knowledge of smokers and it has been found that smokers have little knowledge about tobacco product ingredients and most of them are unaware of the specific harms caused by waterpipe use [1]; this can explain the disassociation of the mondor scale with the typology of warning labels on tumbac packs.

According to several studies, younger people are more sensitive to warnings [18, 19, 49]; however in our findings, there is no association between younger age and the impact of pictorial and textual warning. This might be due to the high percentage of young people in our sample (86.6%). In our study, 73.9% of female smokers were more sensitive to warnings [18, 50, 51], pictorial warning labels associated with the knowledge of smokers and it has been found that smokers have little knowledge about tobacco product ingredients and most of them are unaware of the specific harms caused by waterpipe use [1]; this can explain the disassociation of the mondor scale with the typology of warning labels on tumbac packs.

Disagreeing with a study [52] done on cigarette smokers concerning the influence of chronic symptoms on quitting behavior, our study demonstrated that chronic health symptoms do not motivate the smoker to quit smoking “except for chronic cough”. Furthermore, they inversely affect
the perception of the effectiveness of pictorial warnings on tobacco packs in favor of the text warnings. This might be explained by the unawareness of the smokers of the negative health effects related to waterpipe smoking. Therefore there is a need to highlight the importance of the implementation of shocking images in order to increase the awareness of the deadly effect of waterpipe on public health.

In the multivariate analysis, we demonstrated a statistically significant higher theoretical effect from shocking pictures warnings in highly motivated smokers (OR=4.47, p=0.001). However, in the Italian study (2014) [28], there was no statistically significant effect in highly motivated cigarette smokers but a higher effect in low dependent cigarette smokers. Moreover, in order to avoid seeing the shocking images on tobacco packs, there was a higher incidence of switching from their favorite brand in highly motivated smokers (OR=2.76, p=0.008). Contrarily, there was no statistically significant correlation in the subgroup of cigarette smokers [28]. Agreeing with the article 11a of the WHO FCTC, waterpipe tobacco packaging and all waterpipe parts and accessories must not promote any misleading understanding about tobacco or give an erroneous view of the dangers inherent in its use [30]. It has been demonstrated in Australia, after the implementation of the graphic warnings in 2006, that there has been an increase in avoiding warning labels. This is important because avoidance of warnings is associated with increases in quit attempts [30]. Additionally, we demonstrated a higher motivation to quit waterpipe smoking in smokers who had chronic cough (OR=7.24, p=0.03) independent of the scale of dependence. Whereas, it has been found that smoking cessation in cigarette smokers was related to low FTND scores and high self-efficacy independent of the presence of chronic respiratory symptoms [53]. To our knowledge, this is the first epidemiological study that determined the efficacy of pictorial shocking health warnings versus textual health warnings on tobacco packages for adult smokers in Lebanon.

Limitations

A number of weaknesses in our study derive from its cross-sectional nature between the warning labels and smoking habits. Accordingly, we recommend a prospective study to confirm our results in order to determine if the graphic warning labels improved the smoker’s intentions to quit. Another issue concerns the different settings of inclusion of our sample (respiratory disease patients, smokers conducting a smoking cessation program and general population as well). This may have induced a selection bias in our results. In order to limit this bias, we applied the multivariate logistic model using the gender, age, dependence to smoking and motivation to quit. Finally, as long as self-reported measures were used, it could be affected by social, demographic and environmental characteristics for the comprehension of the message written. But since we are in the list of countries with negative social norms toward smoking, therefore smokers may have perceived the urge to say they intended to quit. Thus, the cognitive and behavioral measures used in this study have been shown recognized to prospectively predict quit attempts in other population [54], reinforcement for their utilization as indicators of health warning effectiveness.

5. Conclusion

The present study is, to our knowledge, the first study conducted in Lebanon that evaluates the effectiveness of textual and pictorial warnings on waterpipe tobacco packages. It is consistent with other research on cigarettes indicating that pictorial graphic warnings are more influencing on the behavior of waterpipe smokers than textual warning. This study indicates that females and more motivated smokers are more hypothetically influenced by shocking pictures. Thus, our study provides further reasons to policymakers in Lebanon to incorporate more tobacco labeling policies in order to help in reducing the widespread of waterpipe tobacco smoking and in increasing the awareness concerning the health symptoms effect of smoking. Moreover, the implementation of tobacco labeling policies concerning pictorial warnings should be explored on other parts of waterpipe devices in future design.

Declaration of interest

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References


