



Original article

Assessment of knowledge, attitude and practice among community pharmacists towards dental care: A national cross sectional survey

Aline Hajj^{a,b,*}, Souheil Hallit^{d,e}, Christel Azzo^a, Frederic Abdou^a, Marwan Akel^{e,f}, Hala Sacre^{e,g}, Pascale Salameh^{c,e,h,1}, Lydia Rabbaa Khabbaz^{a,b,1}

^a Faculty of Pharmacy, Saint-Joseph University, Beirut, Lebanon

^b Pharmacology, Clinical Pharmacy and Drug Quality Control Laboratory, Saint-Joseph University, Beirut, Lebanon

^c Faculty of Pharmacy, Lebanese University, Beirut, Lebanon

^d Faculty of Medicine and Medical Sciences, Holy Spirit University of Kaslik (USEK), Jounieh, Lebanon

^e INSPECT-LB (Institut National de Santé Publique, d'Epidémiologie Clinique et de Toxicologie – Liban), Beirut, Lebanon

^f School of Pharmacy, Lebanese International University, Beirut, Lebanon

^g Drug Information Center, Lebanese Order of Pharmacists, Beirut, Lebanon

^h Faculty of Medicine, Lebanese University, Beirut, Lebanon

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ABSTRACT

Background: Community pharmacists' contribution in health maintenance and promotion is significant but more studies are still needed to evaluate their role as healthcare providers.

Objectives: Our primary objective was to assess knowledge, attitude, and practice among community pharmacists in Lebanon towards dental care. Secondary objectives included assessing the barriers to a good dental care practice and assess their educational needs for oral health counseling.

Methods: A national cross-sectional study was carried out using an online questionnaire and targeting community pharmacists in Lebanon. Five, three and six questions were used to assess pharmacists' perceived knowledge, attitude and practice respectively. Stepwise linear regressions were conducted taking each time a different scale score as the dependent variable.

Results: 497 (78.88%) pharmacists completed the survey (62% females). More than half (53.3%) exhibited good perceived knowledge, 39% a positive attitude and 47.3% a good practice regarding oral health. Pharmacists reported a good perceived knowledge regarding common oral conditions (good, very good and excellent knowledge: 73.2%). Most of the pharmacists (86.52%) perceived oral health promotion as an important part of their services. Moreover, 28.77% (n = 143) of pharmacists declared having difficulties in obtaining oral health information. The main barriers to a good practice included limited interaction between dentists and pharmacists and lack of training regarding oral health. The multivariable analyses showed a significant positive intercorrelation between perceived knowledge, attitude and practice. Working in the pharmacy for more than 40 h a week was associated with higher perceived knowledge (Beta = 2.846). Having a PhD degree was associated with lower practice scores (Beta = 3.676), whereas female gender was associated with lower practice scores (Beta = 2.334).

Conclusions: Pharmacists have the overall required knowledge and attitude to play an important role in the patients' counseling towards dental care.

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* Corresponding author at: Laboratoire de Pharmacologie, Pharmacie clinique et Contrôle de qualité des Médicaments, Faculté de pharmacie, Université Saint-Joseph, Campus des sciences médicales et infirmières (CSM), Rue de Damas, B.P. 11-5076 Riad El Solh, Beirut 1107 2180, Lebanon.

E-mail address: aline.hajj@usj.edu.lb (A. Hajj).

¹ Last co-authors.

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1. Introduction

Because of their knowledge and accessibility (Iwanowicz et al., 2006), as well as the long opening hours of the pharmacies (Blenkinsopp et al., 2002); community pharmacists are frequently approached and contacted by the public for any question related to their health (Iwanowicz et al., 2006). The role of pharmacists has expanded and evolved with time and is not restricted to dispensing medication to patients (Priya et al., 2008). Previous findings revealed that pharmacists are asked at least one question every

week about some oral health-related problem (McLcod), with almost half of them about mouth ulcers. Other findings demonstrated that the majority of patients with oral problems can be managed appropriately within the pharmacy setting (Caruana). In fact, cost, fear from and difficult access to dentists (inconvenient location and time) are among the reasons that prevent general public from having proper dental care (Freeman, 1999; American Dental Association, 2015).

Moreover, most of the products used to treat or maintain oral health can be purchased from pharmacies. Therefore, community pharmacists should be able to adequately counsel about the appropriate use of dental products available in the pharmacy such as products for dental decay/tartar build up (toothpaste/mouthwash), denture hygiene, gum care, etc. In addition, community pharmacists should be able to identify the signs and symptoms of the most frequently encountered oral health problems within the scope of their knowledge and practice, and know when to refer to a dentist/physician.

Lebanon is a small country in the Middle East with a population of around five million inhabitants and 3127 community pharmacies distributed throughout the country (Order of Pharmacists in Lebanon website, 2016). All pharmacists must be registered in the Order of Pharmacists in Lebanon (OPL) in order to practice. Aiming at improving the pharmacy profession and striving for excellence in patient care and scientific development of the country, the OPL motivates pharmacists to provide their patients with the best pharmaceutical service, protect their health and preserve their quality of life. A recent study conducted among community pharmacy owners demonstrated that most Lebanese community pharmacists are not financially satisfied, cannot afford hiring new/additional staff members and lack of time to counsel patients, factors which can have harmful repercussions on patients (Hallit et al., 2017). In addition, the difficulty in getting an appointment with the dentist (Mofidi et al., 2002), encourage people to refer to the community pharmacists to seek advice regarding oral health problems.

To the best of our knowledge, no studies were conducted in Lebanon to evaluate the role of community pharmacists in the provision of oral health care advice. In order to better understand these gaps, this investigational study aimed at assessing the knowledge, attitude and practice of Lebanese pharmacists regarding oral health care as a primary objective. Secondary objectives included assessing the barriers to a good dental care practice and the educational needs of pharmacists, with the ultimate goal of enhancing their role in promoting oral health and hygiene.

2. Methods

2.1. General study design

This study was carried out between November 1st, 2016 and January 31st 2018 using an online questionnaire targeting all community pharmacists from all districts of Lebanon (Beirut, Mount Lebanon, North, South and Bekaa). A list of pharmacies was provided by the Lebanese Order of Pharmacists (OPL), which is the only official association of pharmacists in Lebanon (registration to the OPL is mandatory by law to practice pharmacy) (Order of Pharmacists in Lebanon website, 2016). An online software was used to randomly choose the pharmacies (<https://www.randomizer.org>).

2.2. Sample size calculation

A minimal sample of 350 community pharmacists was targeted, based on the following data: 4000 community pharmacists

(employers and employees) working in 3127 community pharmacies in Lebanon, a 50% expected frequency in the absence of similar studies in the country and a 5% confidence limits (Centers for disease control and prevention). This minimal sample would give an adequate power for bivariate and multivariable analyses to be carried out. At the end of the data collection, out of 4000 pharmacists, 630 pharmacists accessed the online survey but only 497 completed it.

2.3. Data collection process

An online Knowledge, Attitude and Practice (KAP) questionnaire was designed with closed-ended questions in 2 languages: English and French. The link to the questionnaire (www.surveytuner.com/opl-2) was sent to all community pharmacists by 3 different means: push notification using the OPL mobile application, private SMS, and e-mail according to the last cell number and email address available in the OPL database to make sure that the pharmacists will be reached via one of the three methods at least. A reminder was sent every week for a total of five reminders per pharmacist. Some of the questions were inspired from previous studies but adapted to the Lebanese sector (Priya et al., 2008; Al-Saleh et al., 2017; Baseer et al., 2016; Freeman et al., 2017). Pharmacists could read the study's objectives on the designed home webpage and had the choice to accept or refuse to fill out the questionnaire. The system was designed to require an authentication/validation process using the pharmacist's OPL registration number, allowing each pharmacist to access and fill the survey only once. Upon clicking on the survey link, the pharmacist was redirected to the authentication page where he had to choose the preferred language and provide the system with the authentication key (his/her personal OPL registration number) then choose a method of validation (SMS or e-mail). The validation key was sent to the pharmacist's e-mail or mobile phone number through a Web service (SMS Web service). Once the validation key entered and validated by the system, the pharmacist was granted access to the survey. After submitting the survey, the pharmacist was redirected to a page where he could download a booklet (available in both languages English and French) summarizing some pathologies related to oral care and the advices to be given to the patients. On average, the questionnaire was completed by participants within approximately 15–20 min.

As per the OPL rules and regulations, practicing pharmacists are required to document at least fifteen continuous education (CE) credits per year, of which at least 5 should be "live" CEs (Błachnio et al., 2013) in order to avoid license suspension. To encourage pharmacists to participate and increase response rates, the Continuing Education (CE) Committee at the OPL, granted the participants 0.5 CE credit for completing the survey.

2.4. Ethical aspect

The Saint-Joseph University ethical committee approved the study (Reference: USJ-2016-63). All pharmacists gave their consent by accepting to take the online survey.

2.5. Questionnaire (Supplementary data 1)

The questionnaire was available in both French and English, the two languages of pharmacy education in Lebanon and the most frequent languages spoken by the Lebanese population on top of Arabic; it was composed of 5 different sections: 1. Socio-demographic and practice characteristics: age, gender, level of education, location of the pharmacy, demographic area, approximate number of patients per day, years of practice, working hours per week, position in the pharmacy; 2. Questions related to perceived knowledge

in dental care; 3. Questions related to pharmacists' attitude; 4. Questions related to pharmacists' practice in oral health issues; 5. Question related to the barriers that prevent community pharmacists from delivering oral health education within the community.

The questionnaire was initially created in French then translated into English by a pharmacist and then translated back into French by another pharmacist to ensure translation accuracy. Both versions were tested on a pilot sample of 20 pharmacists before the data collection was officially started. Translation discrepancies were few, and they were resolved by investigators, in agreement with the translators. We point out that the pilot sample test results were not entered in the final data sheet.

2.6. Scores measurement

Pharmacists' perceived knowledge score was assessed by five questions evaluating (1) the level of knowledge for the most common oral conditions; (2) the level of training already received in oral health; (3) the level of knowledge confidence when giving advice on some oral health conditions; (4) the interest in receiving further training; and (5) the need for including specific modules related to oral health in the undergraduate pharmacy curriculum. Attitude score was evaluated by three questions assessing if pharmacists (1) are aware of their role in oral health promotion; (2) are willing to engage in a better counseling role in oral health promotion; (3) consider that the dentist-pharmacist collaboration could offer more effective oral health promotion strategies. Six more questions aimed at evaluating the practice of pharmacists related to (1) resources usually used to seek information about oral health; (2) difficulties in obtaining oral health information; (3) most frequently reported oral conditions requiring counseling; (4) information given to the patient buying an oral product; (5) dietary advices regarding oral health; (6) frequency of providing an advice on oral health condition (Table 1). The final score for each category was calculated by summing the points obtained for all questions.

We calculated the reliability of each scale to assess the quality of our data. We obtained high Cronbach alphas for all scales as follows: knowledge scale (0.825), attitude scale (0.674), and practice scale (0.746). Since we obtained good internal consistency, the results we got from these scales are adequate and reliable.

2.7. Statistical analysis

An excel and an SPSS sheet were automatically generated from the online system allowing to perform the statistical analyses (automatic data entry). Statistical analysis was performed using SPSS software, version 23. Two sided statistical tests were used; Chi-2 test for dichotomous or multinomial qualitative variables, whereas the Student *t*-test was used to check for an association between continuous and dichotomous variables. The ANOVA test was used to compare multiple group means. To decrease confounding factors, factors that showed a $p < 0.1$ in the bivariate analysis were included in the multivariable analyses; stepwise linear regressions were conducted taking each time a different scale score as the dependent variable. A $p < 0.05$ was considered as significant.

3. Results

3.1. Socio-demographic results

Six hundred thirty community pharmacists were randomly chosen out of the 4000 registered at the OPL via an online platform; 497 (78.88%) completed the online survey. All respondents com-

pleted the entire questionnaire; 62% were females and 38% males; the mean age was 39.3 ± 10.68 years; 75.1% were employers and 24.9% employees. The majority had a Doctorate of exercise (Pharm.D.) degree (61.6%), saw less than 50 patients per day (44.9%), work more than 40 h a week (66.6%) and had 12 or more years of practice (41.2%). The socio-demographic and socioeconomic characteristics of the participants are summarized in Table 2.

3.2. Perceived knowledge, attitude, practice and barriers

In the absence of cutoff points for the different scores, we considered the median of each score as a cutoff point.

3.2.1. Perceived knowledge

The results showed that 265 (53.3%) of the pharmacists had good knowledge towards oral health. Pharmacists self-reported a good perceived knowledge regarding common oral conditions (good, very good and excellent knowledge: 73.2%) and considered that their knowledge was obtained through personal efforts (67.2%). Few reported having attended conferences, seminars or training modules on oral health (20.5%) and almost 18% declared not having received any training at all. Pharmacists rated a higher level of confidence when giving advices on teething, bad breath, bleeding gums and sensitive teeth (level of confidence rated higher than 85% for very confident and fairly confident). Almost 87% were interested in receiving further training on oral conditions through continuing professional development courses and 87% suggested that additional modules related to oral health should be included in the undergraduate pharmacy curriculum and the top cited topics were gum problems and prevention of decay in children. A detailed description is given in Table 3.

3.2.2. Attitude

The attitude score calculation and comparison to the median cut off point showed that 194 (39%) had good attitude towards oral health. Most of the pharmacists (86.52%) perceived oral health promotion as an important part of their services and they are willing to be more pro-active (87.5%). Almost all of them (93.6%) agreed that a dentist-pharmacist collaboration could offer more effective oral health promotion strategies.

3.2.3. Practice

The results showed that 235 (47.3%) had good practice towards oral health. When it comes to the practice score, 28.77% ($n = 143$) of pharmacists declared having difficulties in obtaining oral health information; the resources usually used to seek this information were internet sites (68.8%), electronic references and databases (29.4%), medical journals (29%), or contact with a general dental practitioner (27.4%). Furthermore, 18.1% used books to look for information. The most frequently reported oral condition/products on which pharmacists provided advice was toothache (420; 84.5%), followed by tooth whitening, bleeding gum, and mouthwash (74.6%, 71.8% and 70.6% respectively). Thirty-six percent of pharmacists said that they were asked about denture related problems.

Frequency of advices on oral health is detailed in Supplementary Fig. 1. Pharmacists rarely give more than 10 advices per week for any product or pathology related to dental care, except for toothpastes. Smoking cessation, denture hygiene, tooth erosion and dietary issues related to oral health are barely discussed with the community pharmacists (less than one advice per month).

3.2.4. Barriers

The most commonly reported barriers to enhance pharmacists' involvement in oral healthcare in Lebanon include limited interaction between dentists and pharmacists (260; 52%), lack of training

Table 1
Detailed explanation on the score rating for each aspect of the knowledge, attitude, practice and barrier scores.

<i>Perceived knowledge score</i>					
Rate your level of knowledge for most of the common oral conditions	Poor (0)	Fair (1)	Good (2)	Very good (3)	Excellent (4)
Training you have already received on oral health ^a	No training (0)	Self-training (1)	Conferences and seminars (1)	Formal training modules (1)	
<i>Rate your level of confidence when giving advice on certain oral health conditions</i>					
Teething	Very unconfident (1)	Fairly unconfident (2)	Neutral (3)	Fairly confident (4)	Very confident (5)
Lost dental fillings	Very unconfident (1)	Fairly unconfident (2)	Neutral (3)	Fairly confident (4)	Very confident (5)
Loose crowns	Very unconfident (1)	Fairly unconfident (2)	Neutral (3)	Fairly confident (4)	Very confident (5)
Bleeding gums	Very unconfident (1)	Fairly unconfident (2)	Neutral (3)	Fairly confident (4)	Very confident (5)
Trauma to teeth	Very unconfident (1)	Fairly unconfident (2)	Neutral (3)	Fairly confident (4)	Very confident (5)
Interested in receiving further training on oral conditions through continuing professional development courses	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree/ don't know (3)	Agree (4)	Strongly agree (5)
<i>Attitude score</i>					
Perception of oral health promotion as an important part of the pharmacist's service role	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree/ don't know (3)	Agree (4)	Strongly agree (5)
Willing to pursue a more pro-active role in oral health promotion	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree/ don't know (3)	Agree (4)	Strongly agree (5)
A dentist-pharmacist collaboration could offer more effective oral health promotion strategies	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree/ don't know (3)	Agree (4)	Strongly agree (5)
<i>Practice score</i>					
Sources that you usually use when you seek oral health information ^a	Internet sites (1)	Electronic references and databases (1)	Books (1)	Medical journals (1)	General dental practitioners (1)
Difficulty obtaining oral health information	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree/ don't know (3)	Agree (4)	Strongly agree (5)
<i>Frequency of giving advice on oral health conditions</i>					
Toothpaste	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Mouthwash	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Cleaning in-between teeth	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Gum care	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Denture hygiene	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Tooth erosion	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Dry mouth	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Dietary advice in relation to oral health	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Smoking cessation	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
Alcohol consumption	Less than once a month (1)	Less than once a week (2)	1–5 times per week (3)	5–10 times per week (4)	More than 10 times per week (5)
<i>Barriers score</i>					
Barriers perceived as preventing community pharmacists from delivering oral health education within the community ^a	Lack of training (1)	Lack of information to give to patients (1)	Difficulty deciding when to refer (1)	Limited interaction between dentists and pharmacists (1)	

^a The pharmacist gets one point for each correct answer (multiple answers possible).

(243; 49%), lack of information to give to patients (178; 36%) and difficulty deciding when to refer (101; 20%).

3.2.5. Score calculations

The calculated scores as well as the correlation coefficients with continuous variables are summarized in [Supplementary Tables 1 and 2](#). The mean score for each scale were as follows: knowledge

(29.73 ± 9.06), attitude (6.63 ± 1.96), practice (35.25 ± 8.3) and barriers (1.57 ± 0.95).

Better attitude ($r = 0.244$) and practice ($r = 0.264$) were significantly associated with better knowledge. Better attitude was significantly associated with better practice ($r = 0.304$). Increased age was significantly associated with lower barriers score ($r = -0.12$).

Table 2
Sociodemographic characteristics of the participants (N = 497).

Variable	
Age (in years); Mean ± SD	39.30 ± 10.68
	N (%)
<i>Gender</i>	
Male	189 (38%)
Female	308 (62%)
<i>Level of education</i>	
Doctorate of exercise	306 (61.6%)
Pharm.D.	102 (20.5%)
Masters	65 (13.1%)
PhD	24 (4.8%)
<i>District</i>	
Beirut	100 (20.1%)
Mount Lebanon	242 (48.7%)
North Lebanon	60 (12.1%)
South Lebanon	70 (14.1%)
Bekaa	25 (5%)
<i>Demographic zone</i>	
Poor	33 (6.7%)
Middle class	216 (43.5%)
Rich	25 (5%)
Mixed	222 (44.8%)
<i>Number of patients per day</i>	
<50 patients	223 (44.9%)
50–100	178 (35.8%)
>100	96 (19.3%)
<i>Years of practice</i>	
<3 years	88 (17.7%)
3 years– <6 years	99 (19.9%)
6 years– <12 years	105 (21.1%)
12 years and above	205 (41.2%)
<i>Working hours per week</i>	
1–16 h	18 (3.6%)
17–31 h	52 (10.5%)
32–40 h	96 (19.3%)
>40 h	331 (66.6%)
<i>Position in the pharmacy</i>	
Employer	373 (75.1%)
Employee	124 (24.9%)
<i>Knowledge of a dental clinic close to the pharmacy</i>	401 (80.7%)

3.3. Bivariate analysis of factors associated with the perceived knowledge, attitude, practice and barriers scores

The results of the bivariate analyses of factors associated with each score are shown in Tables 4 and 5. Perceived knowledge score was significantly and positively associated with the attitude and practice scores. A significantly higher mean perceived knowledge score was found in pharmacists seeing less than 10 patients per day, with patients from a poor socioeconomic class, who had a practice experience less 6 months, and worked between 1 and 16 h weekly. The attitude score was significantly and positively correlated to the practice score ($p < 0.001$). As for practice score, a significantly higher mean practice score was found in males compared to their female counterparts, who had a PhD degree, and who worked more than 40 h weekly. Finally, barriers score was significantly but negatively correlated to age ($r = -0.12$; $p = 0.007$).

3.4. Multivariable analysis of factors associated with the perceived knowledge, attitude, practice and barriers scores

We performed two different multivariate analyses. Table 5 summarizes the factors associated with the same dependent variables, taking the sociodemographic variables as independent variables whereas Table 6 summarizes the factors associated with knowledge, attitude and practice taking the sociodemographic variables and the scales scores as independent variables.

Table 3
Perceived knowledge of the community pharmacists concerning oral health.

<i>How do you rate your level of knowledge regarding oral health issues?</i>	
Poor	70 (14.1%)
Fair	45 (9.1%)
Good	263 (52.9%)
Very good	101 (20.3%)
Excellent	18 (3.6%)
<i>How much training have you already received on oral health? (Multiple answers)</i>	
No training	89 (17.9%)
Self-acquired information	334 (67.2%)
Conferences & seminars	84 (16.9%)
Formal training modules	18 (3.6%)
<i>How do you rate your level of confidence when giving advice on certain oral health conditions such as:</i>	
	Very/fairly confident
Teething	443 (89.1%)
Bad breath	434 (87.3%)
Loose crowns	156 (31.4%)
Lost dental fillings	189 (38%)
Trauma to teeth	211 (42.5%)
Bleeding gums	425 (85.5%)
Gum diseases	354 (71.2%)
Dry mouth	312 (62.8%)
Sensitive teeth	423 (85.1%)
Discolored teeth	256 (59.6%)
Denture problems	227 (45.7%)
Tobacco-related dental problems	393 (79%)
Oral ulcer	402 (80.1%)
Oral cancer	83 (14.7%)
<i>In your opinion, training programs on oral conditions should cover topics such as: (multiple answers)</i>	
Gum problems	415 (83.5%)
Prevention of decay in children	390 (78.5%)
Dietary advice in relation to oral health	361 (72.6%)
Directions for use of oral care products	360 (72.4%)
Denture hygiene	232 (65%)
Smoking cessation	311 (62.6%)
Oral health problems related to cancer and cancer treatments (dry mouth, mucositis, etc.)	296 (59.5%)
Oral cancer	287 (57.7%)

The first linear regression, taking the perceived knowledge score as the dependent variable, showed that working more than 40 h a week ($\text{Beta} = 3.598$) was associated with higher perceived knowledge score, whereas having patients from a middle socioeconomic class ($\text{Beta} = -2.859$) and having less than 3 years of practice were significantly associated with lower perceived knowledge scores.

A second linear regression, taking the attitude score as the dependent variable, showed that having a practice experience between 6 months and 1 year ($\text{Beta} = -1.504$) and having 10–50 patients per day ($\text{Beta} = -0.428$) were associated with lower attitude scores.

A third linear regression, taking the practice score as the dependent variable, showed that working in a rich demographic zone ($\text{Beta} = 3.993$) was associated with higher practice scores, whereas female gender ($\text{Beta} = -2.101$) and having a Master's degree ($\text{Beta} = -2.347$) were associated with lower practice scores (Table 5).

When the multivariable analysis included the other scales scores as independent variables, in addition to the significantly previously identified factors, a significant positive correlation between perceived knowledge, attitude and practice was noted. In addition, having a PhD degree ($\text{Beta} = 3.67$) was associated with higher practice scores. Finally, the linear regression taking the barriers score as the dependent variable, showed that increased age ($\text{Beta} = -0.01$) was significantly associated with a lower barrier score (Table 6).

Table 4
Bivariate analysis of factors associated with each score.

	Perceived knowledge score	Attitude score	Practice score	Barriers score
<i>Gender</i>				
Male	30.26 ± 9.52	6.46 ± 2.01	36.66 ± 8.79	1.64 ± 0.98
Female	29.41 ± 8.78	6.73 ± 1.93	34.39 ± 7.88	1.53 ± 0.93
p-value	0.31	0.136	0.004	0.186
<i>Level of education</i>				
Doctorate in exercise	29.86 ± 9.01	6.61 ± 1.98	35.38 ± 8.65	1.52 ± 0.92
Pharm.D.	30.58 ± 9.11	6.72 ± 1.94	35.03 ± 7.15	1.68 ± 1.06
Masters	27.17 ± 9.03	6.81 ± 1.91	33.47 ± 7.85	1.69 ± 0.92
PhD	31.41 ± 8.91	5.95 ± 2.05	39.46 ± 8.37	1.46 ± 0.78
p-value	0.072	0.305	0.025	0.285
<i>Demographic zone</i>				
Poor	33.36 ± 9.36	6.42 ± 1.95	33.39 ± 8.20	1.51 ± 0.83
Middle class	28.07 ± 8.81	6.54 ± 1.96	34.67 ± 8.29	1.48 ± 0.86
Rich	29.92 ± 8.53	7.40 ± 2.00	38.56 ± 8.24	1.88 ± 1.05
Mixed	30.83 ± 9.06	6.65 ± 1.96	35.73 ± 8.27	1.64 ± 1.02
p-value	0.001	0.202	0.06	0.12
<i>Number of patients per day</i>				
<10	42.83 ± 8.93	6.33 ± 1.96	34.50 ± 5.39	2.16 ± 1.33
10–50 patients	28.81 ± 9.15	6.38 ± 2.02	34.23 ± 8.44	1.50 ± 0.93
50–100	29.97 ± 8.79	6.78 ± 1.83	35.80 ± 8.34	1.63 ± 1.02
>100	30.55 ± 8.77	6.94 ± 2.05	36.59 ± 7.87	1.58 ± 0.83
p-value	0.001	0.069	0.086	0.259
<i>Years of practice</i>				
<6 months	31.44 ± 6.89	7.00 ± 1.41	32.66 ± 8.64	1.55 ± 0.72
6 months – 1 year	24.66 ± 8.89	5.13 ± 2.44	32.86 ± 10.68	1.26 ± 0.46
1 year – <3 years	28.96 ± 8.42	6.61 ± 1.99	35.95 ± 8.04	1.78 ± 0.99
3 years – <6 years	28.02 ± 9.35	6.48 ± 2.00	33.38 ± 7.16	1.65 ± 0.93
6 years – <12 years	30.78 ± 9.79	6.80 ± 2.07	35.89 ± 8.86	1.66 ± 1.06
12 years and above	30.56 ± 8.65	6.72 ± 1.83	35.90 ± 8.30	1.44 ± 0.90
p-value	0.032	0.055	0.091	0.069
<i>Number of working hours per week</i>				
1–16 h	35.16 ± 7.86	6.94 ± 1.69	35.33 ± 8.52	1.77 ± 1.00
17–31 h	26.57 ± 7.54	6.09 ± 2.25	31.67 ± 7.78	1.50 ± 1.00
32–40 h	28.12 ± 9.20	6.59 ± 1.96	34.24 ± 7.96	1.75 ± 1.05
>40 h	30.94 ± 9.07	6.71 ± 1.93	36.11 ± 8.31	1.52 ± 0.90
p-value	<0.001	0.179	0.002	0.144
<i>Position in the pharmacy</i>				
Employer	30.05 ± 9.05	6.72 ± 2.01	35.57 ± 8.26	1.55 ± 0.97
Employee	28.77 ± 9.07	6.37 ± 1.79	34.29 ± 8.39	1.63 ± 0.87
p-value	0.173	0.07	0.135	0.39

*The Student *t*-test was used to compare between 2 groups; The ANOVA test was used to compare between 3 or more groups.

Table 5
Multivariable analyses: Linear regressions taking each scale score as the dependent variable and taking the sociodemographic characteristics only as independent variables.

Variable	Unstandardized Beta	Standardized Beta	p-value	Confidence interval	
<i>Linear regression 1 taking the perceived knowledge score as the dependent variable</i>					
Working more than 40 h per week	3.598	0.187	<0.001	1.964	5.232
Middle class demographic zone	–2.859	–0.156	<0.001	–4.411	–1.307
Years of practice 3 years – <6 years	–2.586	–0.114	0.009	–4.521	–0.651
Years of practice 6 months – 1 year	–5.616	–0.106	0.015	–10.128	–1.103
<i>Linear regression 2 taking the attitude score as the dependent variable</i>					
Years of practice 6 months – 1 year	–1.504	–0.131	0.003	–2.505	–0.504
Having 10–50 patients daily	–0.428	–0.108	0.015	–0.773	–0.083
<i>Linear regression 3 taking the practice score as the dependent variable</i>					
Working 16–31 h per week	–3.928	–0.145	0.001	–6.285	–1.572
Years of practice 3 years – <6 years	–2.397	–0.115	0.009	–4.183	–0.611
Female gender	–2.101	–0.123	0.006	–3.594	–0.607
Rich demographic zone	3.993	0.105	0.016	0.735	7.251
Masters degree	–2.347	–0.095	0.031	–4.478	–0.216

4. Discussion

As stated by the World Health Organization (WHO), oral health is essential to general health and quality of life, and improving the quality of life of people worldwide could go through optimal oral health (World Health Organization (WHO), 2018). Therefore,

healthcare professionals should work together in order to successfully implement evidence-based oral health promotion policies allowing them to play a role in prevention, early intervention or referral to specialized oral healthcare services.

Community pharmacists are trustworthy, and well-respected healthcare professionals that could play a crucial role in delivering

Table 6

Multivariable analyses: Linear regressions taking each scale score as the dependent variable and taking the sociodemographic characteristics and the other scales scores as independent variables.

Variable	Unstandardized beta	Standardized beta	p-value	Confidence interval	
<i>Linear regression 1 taking the perceived knowledge score as the dependent variable</i>					
Practice score	0.197	0.181	<0.001	0.102	0.292
Attitude score	0.807	0.175	<0.001	0.410	1.204
Working more than 40 h per week	2.846	0.148	<0.001	1.251	4.440
Middle class demographic zone	−2.531	−0.139	0.001	−4.035	−1.027
<i>Linear regression 2 taking the attitude score as the dependent variable</i>					
Practice score	0.060	0.254	<0.001	0.040	0.081
Perceived knowledge score	0.036	0.166	<0.001	0.017	0.055
Years of practice between 6 months and <1 year	−1.210	−0.105	0.013	−2.162	−0.258
<i>Linear regression 3 taking the practice score as the dependent variable</i>					
Attitude score	1.183	0.280	<0.001	0.828	1.538
Perceived knowledge score	0.161	0.176	<0.001	0.084	0.239
Female gender	−2.334	−0.137	0.001	−3.767	−0.901
PhD degree	3.676	0.095	0.025	0.456	6.897
Master's degree	−2.079	−0.084	0.046	−4.121	−0.036
<i>Linear regression 4 taking the barriers score as the dependent variable</i>					
Age	−0.011	−0.12	0.007	−0.018	−0.003

quality healthcare to people. Studies have shown that they are regularly asked for a variety of oral health-related matters (Freeman et al., 2017; Sturrock et al., 2017). This is similar to our results where the majority of pharmacists are aware of the importance of their role in oral health promotion and they are willing to stay proactive in this domain.

Limited number of studies have been published regarding the role of the pharmacists as healthcare providers on dental care in England, Australia, India and Saudi Arabia (Priya et al., 2008; Al-Saleh et al., 2017; Baseer et al., 2016; Freeman et al., 2017; Sturrock et al., 2017; Chestnutt et al., 1998; Maunder and Landes, 2005), and only two studies evaluated knowledge and attitude among pharmacists in Riyadh (Baseer et al., 2016; Bawazir, 2014) along with self-care practices (Baseer et al., 2016). Unlike this study (Baseer et al., 2016), who showed an average knowledge, negative attitude and inadequate self-care practices, the results presented in this manuscript highlight a good perceived knowledge, a positive attitude and a reasonable practice regarding oral health. Such differences could be explained by the fact that, in Saudi Arabia, community pharmacies are either owned by individuals or are part of a chain of pharmacies and the role of the community pharmacists is limited to medication dispensing. In addition, most of the pharmacies are managed by non-Saudi pharmacists (Baseer et al., 2016; Bawazir, 2014). At the contrary, in Lebanon, a close interaction between the pharmacists and patients could be noted, and non-Lebanese are not allowed to practice. Therefore, such trustful relationship gives the pharmacists an incentive towards a positive attitude and the need to seek more knowledge. Hence, we have shown herein that pharmacists' knowledge is most of the time self-acquired. This is not surprising since pharmacy students are provided with very few courses/lectures/training sessions relating to oral health and healthcare in community during their undergraduate pharmacy program. This could explain why the level of knowledge was positively correlated with attitude, since pharmacists are willing to learn and take courses/training, but also with practice and long working hours (more than 40 h per week) because a higher oral health knowledge could improve the awareness and hygiene counseling performance. Interested pharmacists showing a positive attitude also search for more knowledge, and the other way around that those with more knowledge feel they can provide good advice.

It was interesting to identify the topics that pharmacists wished to learn during training programs. Hence, they have chosen either

topics that are barely discussed with the patients and for which they expressed a very low level of confidence (such as gum and denture problems) aiming at learning something new, or frequent oral condition/products on which pharmacists provided advices (such as toothache and prevention of caries as well as oral care products) so they go on with fulfilling a meaningful role as oral health advisers (Taiwo and Panas, 2018). Patients asked mainly about the best toothpaste/toothbrush/mouthwash combination with reasonable price for specific oral conditions such in orthodontic/post-operative patients, or for decay prevention, etc. Another leading subject that can be discussed with the Lebanese pharmacist is smoking cessation especially in a country where the highest smoking rates (cigarette/waterpipe) have been reported in the Middle East (Khattab et al., 2012). Moreover, Lebanon is still lacking the vision to implement smoking cessation policies/programs (Bacha et al., 2018) and the community pharmacists could play a major role in counseling and in improving adherence to prescribed treatments.

In the present study, pharmacists showed a positive attitude that could be explained by their relatively good perceived knowledge and adequate practices towards oral health. However, unlike another study which showed that early career pharmacists were more inclined to adopt new initiatives in oral healthcare services (Freeman et al., 2017), we have shown that being young was correlated to a higher barrier score and being less experienced (between 6 months and 1 year of practice) was associated to a lower knowledge and lower attitude. This result could be explained by the fact that younger pharmacists do not have enough experience to develop their personal knowledge and be at ease to provide advices for oral health-related issues, especially in the absence of education/information during their pharmacy curriculum previously discussed.

Moreover, our analyses revealed that practice, apart from being closely related and positively-correlated to both perceived knowledge and attitude, was also correlated to the level of education. Having a PhD improved their practice, probably due to their ability in seeking the needed information; this was particularly true for men. Our results are in line with a study conducted in Saudi Arabia (Baseer et al., 2016). This might be explained by the fact that despite being more represented in our sample, female pharmacists are probably less in contact with sales representatives who give instructions/advices about oral health products. This might be due to the fact that female pharmacists have other familial respon-

sibilities (take care of their homes, raising their children, etc.). Further studies are needed to evaluate this correlation.

Finally, our study showed that limited interaction between dentists and pharmacists was the most reported barrier to integrate oral healthcare services within the workplace. As described by several published articles (Priya et al., 2008; Al-Saleh et al., 2017; Baseer et al., 2016; Freeman et al., 2017), almost all pharmacists agreed that the collaboration between these two professionals could offer more effective oral health promotion strategies, especially that most of them reported knowing a dental clinic in their pharmacy vicinity. Several international associations advocate for a closer working relationship between non-dental and dental professionals to promote oral disease prevention, health promotion and screening (Freeman et al., 2017; Branch-Mays et al., 2017; Lygre et al., 2017). In addition, pharmacists reported their desire for further education and training to benefit their practice in oral health. These results are in line with previous studies which reported that lack of knowledge, lack of training and time, prevented them from furthering their role in oral health (Baseer et al., 2016; Bawazir, 2014).

5. Limitations and strengths of the study

To the best of our knowledge, this is the first national study evaluating the KAP of community pharmacists towards dental care. Our study targeted all pharmacists practicing in Lebanon which provides a representative sample and ensures the generalizability of our finding. Even if some scientists have voiced their concern over the applicability of KAP surveys, they remain an interesting tool that offers accurate information about knowledge, attitude and practice that can be used for educational purposes (Launiala, 2009).

One of the limitations, was the relatively low response rates despite the sufficient sample size. We have chosen the online survey method that is known to be a faster and cost-effective way of collecting data as compared to traditional research survey methods, especially in large national epidemiological studies as ours. Nevertheless, we were limited by the inadequate response rates despite the repetitive reminders sent by push notifications, SMS, e-mails or even during OPL congresses and seminars, and the “rewarding” booklet they could download once the online survey was submitted. Moreover, the use of a questionnaire may not be always accurate: problems in question understanding, question-wording, recall deficiency and over or under evaluating the questions/knowledge, can lead to a possible information bias.

6. Conclusion

In conclusion, this study clearly shows that Lebanese community pharmacists have the overall required knowledge and positive attitude to play an important role in dental care despite all barriers and difficulties. The pharmacists expressed their need for education/training to enhance their practice. In particular, female pharmacists and those with a master's degree. Younger pharmacists are also asked to overcome the barriers to have a more efficient role in dental care counseling. In that perspective, the OPL Continuing Education committee has programmed, developed and implemented, along with some faculties, different types of training and education programs/tools (continuing education, seminars, conferences, booklets) related to oral health (Supplementary material 2). Subjects that enhance the pharmacists' competencies in counseling should be privileged especially smoking cessation, denture hygiene and dental products correct use/choice. Such new approaches would promote the pharmacists' role in awareness and public health strategies.

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Conflicts of interest

The authors have nothing to disclose.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jsps.2019.01.010>.

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