

## Dentist & pharmacist communication awareness about skeletal muscle relaxants; survey in Egypt

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### ABSTRACT

Temporomandibular disorders (TMD) are among the most common problems in clinical dentistry. It is essential to communicate with healthcare providers, Therefore, a collaboration between dentists and pharmacists can help in reducing suffering and alleviating the symptoms of temporomandibular joint (TMJ) disorder. This study aims to assess the current relationship between dentists and pharmacists in treating patients with TMD to improve patient care. The results of asking about pharmacist-dentist communication showed an interesting result where 77.2% of the dentists who participated confirmed the ease of communication and a unique number of only 12 practitioners who stated that no communication is present, the dentists participated suggested eight solutions to overcome the encountered barriers to effective communication. Information about the Skeletal muscle Relaxants (SMR) side effects and drug interaction showed that a large proportion of the participants had little knowledge. In conclusion, It is important to create awareness about the usage of skeletal muscle relaxants, which includes the dosage, methods of administration, advantages, and disadvantages. So, more awareness between dentists and pharmacists is needed.

**Keywords:** *Skeletal muscle relaxants; Egyptian dentists; pharmacists; communication barriers; Awareness.*

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### 1. Introduction

Musculoskeletal disorders are the most common cause of tenderness and muscle spasm; such disorders include fibromyalgia, or its subtype myofascial pain syndrome, and tension headaches, mechanical low back, or neck pain [1]. The causes of musculoskeletal disorders are correlated to local factors including affected muscle groups [2].

In recent years, clinicians and patients have been seeking alternatives to opioids to manage

musculoskeletal conditions such as centrally-acting skeletal muscle relaxants (SMRs). SMRs are a diverse group of medications that are used to treat two different conditions: spasticity from upper motor neuron syndromes and spasms from peripheral musculoskeletal disorders. Spasticity from the upper motor neuron syndrome is a group of symptoms that may be associated with extravagant reflexes, autonomic hyperreflexia, dystonia, contractures, and paresis [3]. Spasticity in many patients can be disabling, with a noticeable effect on functional capability and

quality of life [4].

Temporomandibular disorder (TMD) is a type of musculoskeletal dysfunction in the orofacial region. They are affecting masticatory muscles, temporomandibular joints (TMJ), and associated structures. The main manifestations of these problems are facial and TMJ pain, headache, earache, dizziness, limited mouth opening, locked jaw, abnormal teeth wear facial deformities [5].

SMRs such as baclofen, carisoprodol, chlorzoxazone, cyclobenzaprine, metaxalone, methocarbamol, orphenadrine, and tizanidine, are branded for conditions including spasms and lower back pain; they are used off-label for neuropathic pain, chronic non-cancer pain, TMD pain, and non-pain disorders [6].

Worldwide epidemiological studies denote a soaring TM disorder prevalence. Reports indicate that 39.2% have at least one symptom of the disorder. The incidence rate is 3.9% among adults and 4.6 % among adolescents. The dentist should know the accurate diagnosis and treatment of TMD, as they are the second most commonly repeated complaint [7].

SMRs should be used with caution as they have central nervous system depressant effects, mainly for patients with chronic use of alcohol, anxiolytics, opioid analgesics, or other sedating drugs. There is strong proof that SMRs are related to greater hazards for overall adverse effects, particularly those connected to the central nervous system. The most common and constant adverse effects distinguished with the central nervous system were sleepiness and dizziness [8].

Since the identification and management of this disorder could be a challenging task, communication and collaboration between the interprofessional team are mandatory; this multidisciplinary team consists of oral surgeons, pharmacists, and nurses. Pharmacists give

instructions to patients regarding medications, review doses and possible side effects, in addition to any potential drug interactions check, and report potential concerns to the team [9]. Therefore, the current study aimed to assess the current relationship between dentists and pharmacists and to identify the barriers to this collaboration to recommend new ideas of interprofessional cooperation that aim to improve patient care.

## **2. Materials and Methods**

### **2.1. Study design**

A 28- self-constructed questionnaire was prepared and based on earlier similar studies [10, 11]. The survey consisted of three domains; the first domain is about baseline Characteristics (such as gender, age, clinical profession, dentist Specialty, years of practice, working institution, and patient flow rate per week).

The second domain asked about the knowledge of SMR in dental practice which consisted of two parts the first asked about the usage of SMR among dentists, SMR indications in the dentistry field (with closed-ended questions [Yes/NO]), the most common indications for prescribing SMR in the dentistry field (MCQs), usage of Botox as SMR, the indication of Botox ( both covered using a closed-ended question [Yes/NO]), the most common class of SMR used by Egyptian dentists MCQs covering the most commonly used SMR in the Egyptian Market, side effects of the SMR with, and SMR drug interactions (Yes/No questions)

The second part was concerned with asking the participants about the resources that help them in their practice, such as sources of data about the knowledge of the use of Botox as an SMR and Botox indications, Sources concerning knowledge about SMR side effects, and drug-drug interaction. Those questions were covered

with hybrid questions with an MCQ with the reliable available data resources and others for any additional resource that may be used not in the listed ones.

The third domain asked about the communication between dentists and pharmacists regarding information about medications, the questions include the following: if dentist-pharmacist collaboration could offer more effective oral health promotion strategies with three options (yes, no, or not sure); if there are easy ways to communicate between dentists and pharmacists (A Yes or No question), mention the type and way of this communication if present; if no communication mention the barriers and how to overcome those barriers; (An open-ended questions to reach the most and easiest way of communication if done and if not what are the barriers and methods to overcome them) and finally ask about the importance of communication between dentists and pharmacists is needed (closed-ended questions). The final question was a hybrid one to know which point regarding SMR needed that communication such as (dose, route of administration, ADR, etc.).

The survey was drafted and then exposed to revision and authentication by specialists from the research team to guarantee that the survey was inclusive. Those experts who understand the topic through the questionnaire assessed face validity. They evaluate whether the questions effectively capture the topic under investigation.

A pilot study was then performed to conclude the validity, reliability, and clarity of the questionnaire. Reliability was detected by test-retest reliability which involves administering the survey with a group of respondents and repeating the survey with the same group at a later point in time. We then compare the responses at the two time points.

Content validity was conceded after a pilot

study by collecting pilot data, entering the responses into a spreadsheet, and cleaning the data. This was followed by identifying underlying components using principal components analysis (PCA) by the skilled person, and then Cronbach's Alpha (CA) checked the internal consistency of questions. The final step was revising the survey based on information gathered from the PCA and CA.

The feedback was evaluated, and a final questionnaire was created. The questionnaire parts covered three domains the first domain included the demographic features regarding gender, age, clinical profession, and type of clinic. The second section involved the Knowledge and implementation of skeletal muscle relaxants. The last section dealt with Dentist-Pharmacist communication and the Barriers to the Dentist-pharmacist communication following the completion of ethical approval and review the survey link went live on the 10<sup>th</sup> of February 2021 and was closed at midnight on the 2<sup>nd</sup> of September 2021. The survey was disseminated via online forums through e-mails, WhatsApp applications, and social media dental pages and groups to Egyptian Dental.

## 2.2. Participants

For the sample size calculation, we used the following formula:

$$(n= z2. [P*q]/d2)$$

This was used to calculate the sample size for cross-sectional studies. In this formula, n is the sample size, P is the estimated proportion of the study variable or construct based on previous studies or pilot studies (70%), q = 1-P (30%), and d is the margin of error (10%), where z score was 1.28 for 90% confidence interval.

A total of 120 participants participated in the survey; they consisted of dental healthcare providers, which included academic and non-

academic professionals from different Egyptian hospitals and dental centers.

Eligible participants were approached, their names were not documented, and data was kept private to protect their confidentiality. Participants were 48% academic professionals, 40% non-academic professionals, and 11.7% general practitioners.

### **2.3 Ethics approval**

Survey ethical approval was obtained via the Faculty of Dental and Oral Medicine, Future University Research Ethics Committee in January 2021 (approval no (1)/1-2021). And clinical trial.gov registration no (NCT04747743).

### **2.4. Statistical analysis**

Data were analyzed using an Excel spreadsheet derived from the Google form where numbers and percentages were calculated.

## **3. Results**

### **3.1. Demographics**

The current study's results revealed the SMR usage among different dental healthcare providers through a survey distributed among Egyptian dental health care. The demographic data of the participants (120 participants). **Table 1** showed that the gender distributions were the same between males and females, which was 49.2% while 1.6% preferred not to mention their gender. Regarding the age of the enrolled dentist, 69 of the participants were in the age group between 22 and 30 years, followed by the age group range from 31 to 40 years 43 participants, then age between 41-50 years six dentists, and finally, only two were older than 50 years. The survey showed that a large percentage of participants were academics representing (48.3%); followed by non-academics (40%) and finally general practitioners (11.7%).

Regarding academics, results denoted that

teaching assistants represented the highest percentage (26.6%) followed by assistant lecturers (22.6%) than the lecturers (16.1%) and associate professors (3.3%) while professors represented the smaller percentages (1.6%).

Regarding non-academics, many participants obtained a master's degree, followed by a bachelor holders then finally a Ph.D., and Diploma.

Regarding the specialty of the participants, oral medicine represented the majority of the participants that answered the survey (26 participants), followed by the operative specialty (22), which is the same respondents as endodontics (22); then followed by fixed prosthodontics (17) and oral surgery (15), then finally removable Prosthodontics (10), and Pedodontics, which represent the lesser number of participants 8 participants only.

Considering the years of practice in the field of dentistry results showed that, practice years for less than 5 years were more than half the participants; followed by those between 6- and 10 years. Then those with 11-20 years of experience and finally those with expertise of more than 20 years filled out the survey.

The place of dentist's work was distributed as FUE Dental Hospital showed the highest percentage of participants (28.3%) then doctors' private clinics (10%) Ain Shams University and MUST University same percentages (5%); Fayoum University; & MTI University (3.3%); MSA University and finally, ERU University (1.8%).

Upon asking the dentists about the flow of patients to their clinics by counting the number per week the results showed that from 1 to 10 patients/week was the highest; followed by patients more than 30/week, then followed by a range of 11-20 patients and finally, those from 21-30.

**Table1. Demographic data of the participants**

Data variables		Frequency N (%)	
Gender	Male	59 (49.2)	
	Female	59 (49.2)	
	Prefer not to say	2 (1.6)	
Age (years)	20-30	69 (57.6)	
	31-40	43 (35.6)	
	41-50	6 (5.2)	
	>50	2 (1.6)	
	<b>Academic</b>	58 (48.3)	
Clinical profession	Academic	Teaching assistants	32 (26.6)
		Assistant lecturers	27 (22.6)
		Lecturers	19 (16.1)
		Associate professors	4 (3.3)
		Professors	2 (1.6)
	Nonacademic	48 (40)	
		Master's degree	28 (53.1)
		PhD	10 (8.3)
		Diploma	4 (8)
		Bachelor	6 (30.6)
Dentists Specialty	General practitioners	14 (11.7)	
	Oral Medicine represented	26 (21.8)	
	Operative	22 (18.2)	
	Endodontics	22 (18.2)	
	Fixed Prosthodontics	17 (14.5)	
	Removable Prosthodontics	10 (8)	
	Oral surgery	15 (12.7)	
	Pedodontics	8 (6.6)	
	years of practice	< 5	62 (51.7)
		6-10	34 (28.3)
11-20		22 (18.3)	
> 20		2 (1.7)	
Working institution	FUE Dental Hospital	14 (28.3)	
	Doctors` private clinics	12 (10)	
	Ain Shams University Clinics	6 (5)	
	MUST University clinics	6 (5)	
	MTI University clinics	4 (3.3)	
	Fayoum University Clinics	4 (3.3)	
	MSA University clinics	2 (1.8)	
	ERU University clinics	2 (1.8)	
Patient flow rate per week	1-10	78 (64.9)	
	11-20	14 (12.3)	
	21-30	4 (3.5)	
	>30	23 (19.3)	

N, Number of participants; %, percentage of participants.

### 3.2. Knowledge about SMR in dental practice

The second domain of this survey was the dentist's knowledge about SMR usage in dental practice (**Table 2**) started with a question about

the usage of SMR, where more than half of our enrolled dentists answered yes. The second question was about the SMR indications in the dentistry field; a large number said they knew the dentistry indications of SMR whereas a few

participants did not know.

Data revealed that the most common indications for prescribing SMR in dentistry in percentages as single or multiple indications as 54.9% used SMR in single indications while 41.5% used SMR in multiple indications.

By asking, the practitioners if they knew that Botox is one of the SMRs the results revealed that 72 of the participants said yes and knew the indications of its use, on the other hand, a few participants 48 only answered No and did not know the indications of it.

**Table 2. Knowledge data about SMR in dental practice**

<b>Data variables</b>		<b>Frequency N (%)</b>
Usage of SMR among dentists SMR indications in the dentistry field	Yes	72 (60)
	No	48 (40)
	know the indications	100 (83.1)
	Not known	20 (16.9)
The most common indications for prescribing SMR in the dentistry field	<b>Single indication</b>	
	TMJ	42 (35)
	Bruxism	22 (18.3)
	Sedation	2 (1.6)
	<b>Multiple indications</b>	
	TMJ & Bruxism	40 (33.3)
	TMJ, Anxiety & Bruxism	6 (5)
	TMJ disorder; Bruxism & After surgery	2 (1.6)
	TMJ disorder; Anxiety ; Bruxism & sedation	2 (1.6)
	Anxiety associated with TMJ	0 (0)
Usage of Botox as SMR indication of Botox	Used	85 (71.2)
	Not used	35 (28.8)
	Known	87 (72.9)
	Did No known	33 (27.1)
The most common class of SMR used by Egyptian dentists	Chlorzoxazone	59 (49.1)
	Cyclobenzaprine	28 (23.6)
	Dantrolene	25 (12.7)
	Baclofen	11 (9.1)
	Methocarbamol and diclofenac potassium	2 (1.6)
	Tizanidine	2 (1.6)
	Did not used	2 (1.6)
Side effects of the SMR	Know	72 (60.3)
	Did not know	48 (39.7)
SMR drug interactions	Know	26 (22)
	Did not know	94 (78)

N, Number of participants; %, percentage of participants.

As for the most common class of SMR used by Egyptian dentists, the results showed that Chlorzoxazone was the highest class in usage (49.1%) followed by Cyclobenzaprine (23.6%), Dantrolene (12.7%), and then Baclofen (9.1%); while our participants added classes that were not mentioned in the questionnaire like Methocarbamol, Diclofenac potassium and Tizanidine represented (1.6%) of the respondents also a 1.6% of our participants use any of them.

By asking the participants about the side effects of the SMR, more than half knew that they had many side effects. In addition, regarding the possible SMR drug interactions, an interesting finding was that 94 individuals did not know about possible interactions of SMR.

Finally, by asking the participants about the knowledge resources that help them in their practice, the results revealed their answers (**Table 3**) as the following:

The different sources of data about the knowledge of Botox as an SMR varied from Postgraduate study, Dental guidelines; Personal experience; a colleague pharmacist; Google; Undergraduate education; scientific conferences and courses; and finally, a combination of all these sources.

Regarding the participant's sources of information about different indications of Botox in the dentistry field, and of possible drug-drug interactions of SMR, the results revealed many sources with different percentages in a sense by the dentists as in **Table 3**.

### **3.3. Communication between dentists and pharmacists regarding information about Medications**

The third domain in this survey as shown in (**Table 4**) was about communication between dentists and pharmacists, when asking the dentists if they think that collaboration between dentists and pharmacists could help in more active oral health promotion or not 87.7% think that such collaboration is beneficial to promoting oral health strategies 8.8% found such communication was not important and 3.5% were not sure about it.

105 of the enrolled dentists confirmed that there are easy communication ways between dentists and pharmacists while 11 did not agree with that and only 5 were not sure. Those dentists who confirmed that there are easy ways of communication between dentists and pharmacists were further asked about what those ways are and according to their answers.

A phone call is the most common easy way of communication represented 9.5% followed by a visit to a nearby pharmacy; the WhatsApp application and pharmacies' hotline are the same percentages 7.1%.

Only a few dentists (8) of the enrolled participants thought that there is no communication, and they attributed this to; most pharmacists-as they stated- only caring about selling the drugs with a higher price tag, most pharmacies do not have pharmacists and they rely only on some technicians, no direct communication is available between pharmacists

and dentists beside lack of actual understanding of each one's needs and interests regarding drugs.

The enrolled dentists suggested 8 solutions to overcome the poor communication between

dentists and pharmacists as shown in the table. According to the current study, most dentists (94.7%) think that more awareness regarding the importance of communication between dentists and pharmacists is needed as seen in (Table 4).

**Table 3. Source of information data**

Data variables	Frequency N (%)	
Source of data about the knowledge about Botox as an SMR seen	Postgraduate study	22 (18.3)
	Dental guidelines	12 (10)
	Personal experience	14 (11.6)
	Colleague pharmacist	10 (8.3)
	Personal experience & Google	6 (5)
	Undergraduate education	4 (3.3)
	Google;3.3% Undergraduate education; % and	2 (1.6)
	1.6% Scientific conferences	
Sources used to know Botox indications	A combination of all these sources.	6 (4.9)
	Postgraduate study	22 (18.3)
	Personal experience	15 (5)
	Dental guidelines	10 (8.3)
	From a colleague pharmacist	73 (6.6)
	Dental guidelines & postgraduate studies	4 (3.3)
	Courses	2 (1.6)
	Postgraduate studies & a colleague pharmacist	2 (1.6)
	Undergraduate education Postgraduate studies & a colleague pharmacist	2 (1.6)
	Postgraduate Studies & Personal Experience	2 (1.6)
Source concerning knowledge about SMR side effects	Dental guidelines	26 (21.6)
	Personal experience	24 (20)
	Postgraduate study	14 (11.6)
	From a colleague pharmacist	8 (6.6)
	Dental guidelines, undergraduate education & postgraduate studies	4 (3.3)
	Undergraduate education	3 (1.8)
	Dental Guidelines Postgraduate studies & Personal experience	3 (1.8)
	Dental guidelines & postgraduate studies	3 (1.8)
Drug-drug interaction	Dental guidelines	10 (8.3)
	Undergraduate education	8 (6.6)
	Postgraduate studies	8 (6.6)
	Personal experience	4 (3.3)
	From a colleague pharmacist	8 (6.6)
	Dental Guidelines & Undergraduate Education	2 (1.6)

N, Number of participants; %, percentage of participants.

**Table 4. Communication between dentists and pharmacists regarding information about Medications**

Data variables		Frequency N (%)
-Do you think dentist-pharmacist collaboration could offer more effective oral health promotion strategies	Yes	105 (87.7)
	No	11 (8.8)
	Not sure	5 (3.5)
-Are there easy ways to communicate between dentists and pharmacists?	Yes	93 (77.2)
	No	27 (22.8)
-If yes, mention the type and way of this commutation	Phone call	12 (9.5)
	visit a nearby pharmacy, WhatsApp application, and pharmacies' hotline	9 (7.1)
If NO Mention the barriers	-Most pharmacists only care about selling the drugs with the higher price tag	8 (6)
	-Most pharmacies don't have pharmacists and they rely only on technicians	
How to overcome those barriers?	-No direct communication is available between pharmacists and dentists	
	- lack of actual understanding of each one's needs and interests regarding drugs	
	- More medical rep. visits to dentists	10 (8)
	-Educate the pharmacists that their role is to support Drs, not compete with them	
	-Direct pharmacist contact	
	-Make a direct connection	
	-A bit of perseverance	
	-Summits	
	-Google it	
	The overcome the core problem is by emphasizing practical knowledge during undergraduate studies in both fields	
Do you think more awareness regarding the importance of communication between dentists and pharmacists is needed?	yes	114 (94.7)
	no	6 (5.3)

N, Number of participants; %, percentage of participants.

#### 4. Discussion

To our knowledge, this is the first published data regarding the assessment of collaboration between dental healthcare providers and pharmacists about the implications of SMR in patients with dental problems.

The present survey was designed to investigate dental-pharmacist communication

about the usage of SMR by Egyptian dental professionals and practitioners. The use of SMR as a role model of communication between dentists and pharmacists may be due to the wide range of dental conditions that necessitate the use of SMR and the lack of information among practitioners; especially doses, side effects, and drug-drug interactions [12].

The survey was designed also to try to find if any barriers and obstacles interfere with this communication and find a means to increase the collaboration between them about the implications of musculoskeletal relaxants in the future.

According to the study results, data obtained from different Egyptian clinics indicated that about 60% of enrolled dental care providers used SMRs in their practice while 40% did not use them. Those who used SMR obtained different degrees in different specialties as the following: 53.1% obtained a master's degree; 8.3% Ph.D.; 8% Diploma; and 30.6% Bachelor's degree.

Results also denoted that a large number of participants that answered the survey are in the academic field and more than the number of non-academics.

The dentists that used SMR were from different specialties as Operative and endodontics 18.2%, Fixed and Removable Prosthodontics 22.5%, Oral Medicine 21.8%, Oral Surgery 12.7% and Pedodontics 6.6%. Of all these dental doctors about 83.1% know the different SMR indications and prescribe them in the field of dentistry versus 16.9% who did not know.

TMJ disorder (35%) was the highest reason for the prescription of SMR then Bruxism (18.3%) and the use for both (TMJ & Bruxism 33.3% and for (TMJ, Anxiety & Bruxism 5%) followed by minimal prescription for sedation about 1.6%. The results indicate also about 71.2% used SMR in Botox and 28.8% had not used them.

Chlorzoxazone was the most commonly prescribed skeletal muscle relaxant representing 49.1%, Cyclobenzaprine 23.6%, Dantrolene 12.7%, and then Baclofen 9.1%; while our participants added 2 classes that were not mentioned in the questionnaire Methocarbamol & Diclofenac potassium 1.6% and Tizanidine 1.6%.

One of the aims of this survey is to know the dental doctor's knowledge about side effects and drug-drug interaction of SMR because this information can be obtained in detail from pharmacists if there is any communication, the results denote that 60.3% were aware of the SMR side effects and 39.7% of were not and about 78% of dental health providers were not aware of SMRs uses in combination with other drugs, only 22% have had some information about the combination of SMR with other medications that can affect health and life of the patients, and this represents a very low ratio. Since healthcare continues to go forward and shift to collaboration among different disciplines Cynthia and Eric 2015 [13]. Dentists' and pharmacists' Collaborations have the potential to improve patient care, but in practice, the examples of interprofessional models between these disciplines are limited. The reason may be due to perceptions that disconnect oral health overall. Health is often regarding the former as a luxury and fails to appreciate its influence on overall well-being [14].

Concerning Egyptian dentists who participated in this study, about 87.7% think that collaboration between dentists and pharmacists could provide more effective oral health promotion strategies while 8.8% did not agree with that and 3.5% are not sure. In addition, 77.2% of the participants confirmed that there are easy communication ways between dentists and pharmacists while 22.8% did not agree with that. A phone call is the most common easy communication method (9.5%) followed by a visit to a nearby pharmacy, WhatsApp application, and pharmacies' hotline (7.1% for each way). From the previous ratio, we could conclude the importance of the cooperation between dentists and pharmacists to enhance patient care and increase efficiencies in providing care, but the current relationship appears to be

limited to phone calls regarding the ordering of prescriptions and prescription clarification.

Cynthia and Eric 2015; showed through interprofessional practice models that there are many other areas of interprofessional collaborations between both dentists and pharmacists including pain management, prevention, and treatment of infection, in which patient care can be improved in an effective way [13].

Weinberg 2006; said that pharmacists may also help in oral health preventive services such as preventing oral cancer by delivering educational tips and counseling on tobacco termination and offering therapeutic recommendations for help in quitting [15].

The survey results denoted that only 12 dentists who participated in the study thought that there is no communication and they attributed this to various causes such as; most pharmacists- as they stated- only care about selling the drugs with a higher price tag, most pharmacies don't have pharmacists and they hire technicians only, no direct communication is available between pharmacists and dentists beside lack of actual understanding of each one's needs and interests regarding drugs.

The same results were found by Brown et al., 2019; who explained that many challenges to this collaboration are presented because dentists and community pharmacists traditionally operate in "silos" independent of other healthcare providers and with their health records, which are not integrated with the rest of the patient's medical records [16]. In addition, MacEntee 2011 stated that community pharmacists who work in independent or chain pharmacies tend to be physically detached from other professionals, confining interprofessional contact to fax, phone calls, or other electronic means of communication [17].

Our enrolled practitioners suggested 8 solutions to improve the poor communication between dentists and pharmacists and they are mainly; further educate the pharmacists that their work is complimentary to the dentists' work; increase the direct contact between dentists and pharmacists through conferences and scientific meetings together with increase the undergraduate studies of both faculties-Dentistry and Pharmacy- about the knowledge needed for the market.

Our results are in line with MacEntee 2011; who reported that to achieve meaningful collaborations between dentists and pharmacists, team participants should have the desire to work in partnerships, keep shared respect and trust, and have an understanding of each other's roles [17].

According to Choi et al., 2017 model of communication between dental and pharmacy students, results denoted that interprofessional training of pharmacy and dental students has the potential to fill some of the medical gaps. Pharmacy students can learn and instruct dental colleagues how to collect and document a thorough medication history while dental students can strengthen drug knowledge on how certain medications affect oral care [18].

Patients benefit from these relationships are mandatory in many ways than just conversations such as prescription clarification or slight modifications in therapy, Pain management recommendations, infection prevention, and management of adverse drug effects related to oral health are just some examples of how these relationships can advance patient care as shown in Lygre et al., 2017 study [19]. The study by Choi et al., 2017 [18] assessed the number and type of medication inconsistencies in daily usual care at a free dental clinic. This study revealed that medication errors are the prominent discrepancy, with omitted medications causing marked adverse effects important to oral care.

Scott et al., 2017 [20] stated that ongoing, professional relationships between dentists and pharmacists will improve comprehensive patient care as each profession provides its expertise.

Since dentists and pharmacists share responsibilities or have complementary responsibilities related to patient care within the specific levels of the care, they each deal with, they should share complementary duties to provide good and necessary areas for potential collaboration. This can be achieved by promoting patient care in different medical indications such as drug allergies, drug interaction, and pain control. Prevention and management of oral infections are also crucial medical conditions that require this communication, especially with the development of antimicrobial resistance Thurston et al., 2017 [21].

All of these examples and circumstances are necessary for both the dentist and the pharmacist in the patient's assessment. This collaboration assures recognition of problems that may need to be treated and the appropriateness of therapies that may be needed or avoided. The dentist's patient chart and the pharmacist's patient-medication profile will likely complete each other [22].

Therapeutic recommendations might be made to the referring dentist if he has any concerns about therapy arising secondary to drug-disease interactions, drug-drug interactions, or allergic reactions related to the medication [23]. Several factors should be considered to augment this collaboration such as the creation of agreements or documents that define the obligations, roles, and responsibilities of each partner. These agreements might be unofficial at first. These agreements may subsequently develop into more formal and binding contracts, and this partnership may include the development of patient care protocols and/or referrals. It would also be crucial to monitor the advancement of

these arrangements, determine and resolve any problems, and make improvements where needed. To monitor and strengthen the partnership, it would be highly helpful for the partners to hold regular meetings. Given that, each professional's top priority is the care of patients. Additionally, it is crucial to acknowledge that certain patients may prefer to work with one partner in a dentist-pharmacist interprofessional team to the other [24].

### **Conclusion**

Gaps eradication in medical care is one of the goals we seek, it is mandatory to encourage and foster collaboration among all healthcare professionals. With the implementation of a continuous unified process that facilitates the treatment of oral conditions by dentists and pharmacists in a patient-centered attempt, it would be anticipated to get an increase the patient satisfaction, patient safety, and overall patient health and well-being.

### **Recommendation**

This continuous communication would afford a further wide-ranging care approach to patients, where both professions are capable of drawing from each other's skills and expertise to provide ideal patient care. However, further future studies are needed to be conducted on the application and implementation of the proposed models to determine the presence and scope of these benefits.

### **Abbreviations**

TMD, Temporomandibular disorders; TMJ, Temporomandibular joint; SMRs, Skeletal muscle relaxants; FUE, Future University in Egypt.

## Declarations

### Ethics approval and consent to participate

The Research and Ethics Committee of Future University in Egypt granted ethics approval for the study (approval no (1)/1-2021). And clinical trial.gov registration no (NCT04747743).

Written information about the study was provided before participation and all participants.

provided informed consent before questionnaire completion. Informed consent was obtained

from all individual participants included in the study.

### Consent for publication

All authors confirm their approval to publish this manuscript.

### Availability of data and material

All data generated or analyzed during this study are included in this published article in the main manuscript.

### Competing interests

The authors have no potential conflict of interest.

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### Authors' contributions

All authors contributed to the study's conception and design. Material preparation, data collection, and analysis performed by Doaa El-Bohy and Sara Elkot. The first draft of the manuscript was written by Hayam Ateyya and Doaa El-Bohy. All authors read and approved the final manuscript.

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