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Knowledge, behavior and attitudes of dental practitioners towards photodynamic therapy use in dental practice

Fahim Vohra[a,*], Ishfaq A Bukhari[b], Saeed A Sheikh[b], Refal Albaijan[a], Abdul Hakeem Qureshi[c], Zaeem Arif[d], Zohaib Akram[e]

[a] Department of Prosthetic Dental Sciences, College of Dentistry, King Saud University, Riyadh, Saudi Arabia
[b] Department of Pharmacology, College of Medicine, King Saud University, Riyadh, Saudi Arabia
[c] Department of Operative Dentistry, Liaquat College of Medicine and Dentistry, Karachi, Pakistan
[d] Department of Oral Pathology, Faculty of Dentistry, Ziauddin University, Karachi-756000, Pakistan
[e] Department of Periodontology, Faculty of Dentistry, Ziauddin University, Karachi-756000, Pakistan

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ABSTRACT

Background: The aim of the present study was to assess knowledge, behavior and attitudes of dental practitioners (DPs) towards photodynamic therapy (PDT) in dental clinical practice.

Methods: A cross-sectional study was performed and a 13-item survey questionnaire was given to DPs practicing in 13 different teaching hospitals in Karachi, Pakistan. Questions were aimed at exploring the knowledge of DPs regarding PDT and their attitude towards PDT and perceptions that may influence clinical practices. Chi-square and spearman coefficient were conducted to compare subgroups and correlate factors with the knowledge score of DPs.

Results: A total of 509 questionnaires were completed (response rate = 82%). Median age of participants was 34 years and 70% were females. Most DPs demonstrated good knowledge related to PDT, and nearly 77%, 69% and 62% were aware of the mechanism of action and the role of photosensitizers in PDT respectively. It was reported that 74% of the respondents expressed that they are comfortable to know about PDT in detail for their clinical practice. A cumulative 54% disagreed that discussing the option for PDT with their patients was peripheral to their role as clinicians. A striking 82% would like to attend seminars and workshops on PDT. Significant difference was found among senior lecturers and assistant professors for the knowledge items ($p < 0.05$). No statistical correlation was found between the knowledge items score of DPs and their behavior ($r = 0.18$; $p = 0.762$), attitude ($r = 0.04$; $p = 0.594$) and self-rated knowledge ($r = 0.42$; $p = 0.854$).

Conclusion: Dental practitioners showed adequate knowledge regarding PDT and its use in dentistry. However, expertise with regards to handling and training is warranted so that DPs could use PDT in their dental practice.

1. Introduction

Photodynamic therapy (PDT) is a medical treatment that utilizes light of specific wavelength and excites dye molecules (photosensitizer) in the presence of oxygen. The exposure of the photosensitizer to light results in the formation of oxygen species, such as singlet oxygen and free radicals, causing localized photodamage and cell death [1,2]. Clinically, this reaction is cytotoxic and vasculotoxic. Depending on the type of agent, photosensitizers may be injected intravenously, ingested orally, or applied topically [3].

Photodynamic therapy has been proposed in modern dental practice as a treatment strategy for various oral diseases. Their wide use range from treating oral cancers, fungal, bacterial, viral, autoimmune disorders as well as periodontal diseases [4–11]. Moreover, the use of PDT in dental practice is common in developed countries. There is little argument that over recent years the use of PDT in dentistry worldwide has moved beyond academic centers and specialist units into the mainstream of general practice [12]. Looking to the future, it is expected that specific laser technologies of that including PDT will become an essential component of contemporary dental practice over the next decade [13].

To date, laser therapy alone is being commonly used but the use of PDT is limited. This is attributed in some of the underdeveloped countries where the prevalence of oral diseases are common, but the use of photochemotherapy is scarce [14]. This primarily could be due to the level of knowledge, expertise/training in the use of PDT and

* Corresponding author.
E-mail addresses: fvohra@ksu.edu.sa (F. Vohra), drzohaibakram@gmail.com (Z. Akram).

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operating cost of the treatment that hampers proper compliance with regards to both clinicians and patients. Studies are required to prove these inadequacies. With the aim of assessing knowledge and training received regarding PDT, we surveyed dental practitioners (DPs) about their level of general knowledge, behavior and attitudes towards PDT in dental practice.

2. Materials and methods

A short self-administered structured questionnaire was distributed to DPs from 13 teaching hospitals in Karachi, Pakistan. Questionnaires were hand delivered and emailed using Google forms to DPs of different University hospitals. This 13-item questionnaire was developed to assess the knowledge, attitudes, and behaviors of DPs towards PDT and its practice. The questionnaire was designed based on previously published questionnaire [15]. Participation was voluntary and anonymous, and the questionnaire, including five true and false knowledge items, and eight Likert-scale questions, was pretested and completed in ~10 min. The first section of the questionnaire inquired regarding demographic details of participants including age, gender, academic designation, clinical experience in years and academic institute. Section two included five true and false questions assessing knowledge items. Next section included eight Likert-scale questions which summarized the responses to questions exploring behavior towards PDT practice, perceived knowledge and training. The questions also explored attitudes toward PDT and perceptions that may influence clinical practices of DPs. Respondents were instructed to mark the single best answer for both knowledge and Likert-scale items. DPs were asked to respond to questions related to clinical practices based on their clinical experiences.

Statistical analyses were performed using commercially available statistical software (SPSS v.21, Chicago IL). Medians and interquartile ranges for age and true/false knowledge items were reported. Each respondent could score a maximum of 5 and minimum of 1 score (for Section 2), earning a point for each true/false question answered correctly. Chi-square analyses were conducted to compare subgroups according to academic positions. The Spearman correlation coefficient was used to correlate behavior, perceived knowledge and clinical perceptions with the knowledge score of DPs. The Ethics Review and Research Committee, Ziauddin University approved the study. The informed consent was exempted because of the minimal risk nature of this study.

3. Results

Six hundred and twenty two questionnaires were handed out and emailed to participants. A total of 509 participants [152 (30%) male; 357 (70%) female] returned completed questionnaires at a response rate of 82%. A total of 388 (76%) were hand returned and 121 (24%) were returned back by email. Thirty-one questionnaires were incomplete and 82 emailed questionnaires were unreturned and were excluded from the analysis. Table 1 shows the demographic characteristics of the participants. All participants had graduated from 13 different medical institutes. The median age of the participants was 34 years (interquartile range: 25–47 years). Table 2 shows the true/false knowledge items with the correct answer and the percentage of DPs who answered each question correctly. Most DPs demonstrated good knowledge related to PDT, and nearly 77%, 69% and 62% were aware of the mechanism of action and the role of photosensitizers in PDT respectively. Fig. 1 summarizes the overall scores of the responders' (percentage) in response to the five true and false questions assessing knowledge items. The median score for five-question quiz was 4 (interquartile range: 1–5), and a maximum score of 4 was achieved by 43% of the DPs.

Figs. 2–4 summarizes the responses to questions assessing attitude, practice and behavior of DPs towards PDT. Questions regarding clinical practices were interpreted to reflect practices and behaviors in medical institute: almost 91% of DPs never discuss therapeutic options of PDT with their patients, and nearly 89% of DPs never refer their patients for the treatment of oral diseases with PDT (Fig. 2). Questions exploring attitudes of DPs towards PDT practice and their perceptions in knowing about photochemotherapy that may influence clinical practices are shown in (Fig. 3). It was reported that 74% of the responders' expressed that they are comfortable to know about PDT in detail for their clinical practice, and a total of 77% of DPs do not expect patients to discuss PDT options for dental care. A cumulative 54% disagreed, that discussing the option for PDT with their patients was peripheral to their role as clinicians. A striking 82% of DPs would like to attend seminars and workshops on PDT and their applications in dentistry.

Questions exploring perceived knowledge and training of DPs are shown in Fig. 4. Sixty-five percent of DPs reported moderate understanding of PDT. Furthermore, a striking 98% of participants did not receive any training on PDT in medical school. For the subgroup analysis by academic designation, a significant difference was found among

Table 1
General characteristics of dental practitioners (n = 509).

Characteristics of dental practitioners	**Respondents**
Age in median (interquartile range)	34.4 (25.6, 47.5)
Gender – n (%)	
Male	152 (30)
Female	357 (70)
Designation – n (%)	
Resident	148 (29)
Lecturer	167 (33)
Senior Lecturer	88 (17)
Assistant Professor	46 (9)
Associate Professor	35 (7)
Professor	16 (3)
Others	9 (2)
Clinical experience in years – n (%)	
1–4	238 (47)
5–9	211 (41)
≥10	60 (12)
Local graduate medical schools – n (%)	
Ziauddin Medical University	58 (11.3)
Aga Khan University Hospital	36 (7.0)
Baqai Medical University	67 (13.1)
Jinnah Medical and Dental College	51 (10.0)
Jinnah Postgraduate Medical Centre	44 (8.6)
Liaquat University Hospital	31 (6.0)
Jinnah Sindh Medical University	45 (8.8)
Liaquat College of Medicine and Dentistry	44 (8.6)
Dow University of Health Sciences	56 (11.0)
Karachi Medical and Dental College	25 (4.9)
Bahria Medical College	28 (5.5)
Bin Qasim Medical Institute	12 (2.3)
Altamash Institute of Dental Medicine	12 (2.3)

Table 2
Response summary of dental practitioners regarding knowledge items assessed in the study (n = 509).

Item	Correct answer	Answering correctly
1. Photodynamic therapy is an invasive technique.	False	58%
2. Photosensitizer does not play significant role in PDT.	False	62%
3. Free radicals in PDT cause rapid destruction of the target tissue.	True	69%
4. Most photosensitizers are activate by red light between 630 and 700 nm.	True	26%
5. Photodynamic therapy targets microbial cells only and not tissue.	False	77%