



## Research paper

# General dentists' knowledge and practice about corticosteroid prescription

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## ABSTRACT

**Introduction:** Lack of adequate familiarity with indications, contraindications, and possible complications of corticosteroid prescription may lead dentists toward unreasonable administration of these drugs, which can be deleterious to patients' health and their quality of life.

**Aim:** The aim of this study was to evaluate general dentists' knowledge and practice about corticosteroid prescription during 2016 in Rasht, Iran.

**Material and methods:** This cross-sectional descriptive study was performed through a census using a valid self-made questionnaire pertaining to demographic information, knowledge, practice and opinion assessment questions. The questionnaire was completed by 110 general dentists and the data were analyzed using SPSS v. 16. Mann–Whitney and Kruskal–Wallis tests were used in this study. The significance level was set at  $P < 0.05$ .

**Results and discussion:** The median dentist's knowledge score was 5 (out of 7) with 58% frequency. Eighty two (78.2%) of the dentists were in the medium knowledge level, while 32 (29%) of them had prescribed corticosteroids in necrotic teeth with cellulite and diffused swelling, a decision that can lead to intensification and expansion of infectious complications. There was no statistical correlation between knowledge and also the practice of dentists and their age, sex, work experience, and the dental school where they had graduated from.

**Conclusions:** This study illustrated that Rasht dentists' knowledge about indications, contraindications, and complications of corticosteroid prescription has deficiencies which should be addressed by more appropriate syllabi in dental schools, continuing education workshops, and pamphlets.

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## 1. INTRODUCTION

Corticosteroids are naturally produced by the adrenal glands in the human body and regulate important processes such as the metabolism of fat, carbohydrates, and proteins. They also affect the immune system function, and regulate water and minerals balance. Natural steroids and their synthetic analogs are widely used in dentistry. They are used as anti-inflammatory agents in treating some of the oral diseases as well as in reducing edema, pain, and lockjaw. Hydrocortisone, dexamethasone, methylprednisolone, and prednisolone are among the common corticosteroids prescribed in dentistry.<sup>1</sup>

There are numerous known side effects of corticosteroid administration that are categorized into systemic use side effects and topical use side effects.<sup>2</sup> Instances of the former are adrenal suppression, moon face, buffalo hump, osteoporosis, hypertension and hyperglycemia,<sup>3,4</sup> and of the latter side effects are mucocutaneous atrophy, contact dermatitis as well as infection dissemination.<sup>5–8</sup> Due to the significance of the aforementioned side effects, it is vital to weigh the benefits versus risks when considering these pharmaceuticals. In fact, that is the reason for practitioners' hesitation in treating corticosteroid-responsive conditions.<sup>2</sup>

Dentists' lack of knowledge on side effects, indications and contraindications may lead the dentist to irrational use of corticosteroids that in turn will affect patients' health and quality of life.

## 2. AIM

By considering low number of researches about indications and contraindications of corticosteroids in dentistry, the aim of this research is to study the knowledge and the practice of general dentists in Rasht, Iran about the prescription of corticosteroids by valid questionnaires.

## 3. MATERIAL AND METHODS

The present research was a descriptive cross-sectional study. Out of 190 general dental practitioners in Rasht, 110 dentists participated in this research. The inclusion criterion was being a general dentist and the exclusion criterion was the failure to complete the questionnaires. All participants were informed of the research objective and its confidentiality policy, and informed consents were obtained from them. The ethics committee code for the present study is 1562-95.124.

The assessment tool of this study was a self-made questionnaire that consisted of four parts including demographic characteristics, questions about knowledge, questions about practice, and questions about their personal opinion regarding corticosteroid use. Demographic questions included questions about age, gender, how long has it been since they have graduated, the dentistry school they have graduated from as well as their work experience. There were 7, 6 and 9 questions in the knowledge, practice, and personal

opinion parts, respectively. The questionnaire was validated by 14 dental specialists. Content validity ratio (CVR) and content validity index (CVI) were calculated for all questions and were higher than the least favorable measures according to Lawshe chart. Content validity for simplicity, specificity, and clarity of the questions was 0.92, 0.93 and 0.97, respectively. Reliability was checked by the test-retest method; i.e., the questionnaire was completed twice by 10 dentists with a 10-day interval. Reliability of the knowledge questions was 0.95 (CI: 0.82–0.98) using intraclass correlation coefficient (ICC).

The reliability of the questions about practice (measured by Kappa agreement coefficient for each question) for questions number 8 and 9 was 0.62 and 0.78, respectively; and it was 0.90 for the other questions. The reliability of the questions in the personal opinion part was 100%. After collecting the questionnaires, the data were analyzed by SPSS (v. 16) statistical software. To calculate the score of knowledge, each correct answer merited 1 point, while the wrong ones were 0. Therefore, for the total of 7 questions, the possible score range was 0–7. Mann–Whitney and Kruskal–Wallis statistical tests were used for studying the correlation between knowledge score with gender and the *alma mater*. Moreover, Spearman correlation coefficient was used for studying the correlation between knowledge score with age, the amount of time since graduation, and work experience. The significance level was set at  $P < 0.05$ .

## 4. RESULTS AND DISCUSSION

Out of 110 dentists, 82 (74.5%) were male and 28 (25.5%) were female. The mean age of participants was  $45.8 \pm 8.8$  years old; and the youngest and the oldest participants were 28 and 69 years old, respectively. The mean amount of time since graduation was 19.5 years with minimum and maximum of 4 and 36 years, respectively (with the interquartile range of 11 to 23 years). Moreover, the mean work experience of the participants was  $17.6 \pm 6.9$  with maximum and minimum of 4 and 34 years, respectively. The most frequent *alma mater* was Tehran University of Medical Sciences (42.7%), followed by Guilan University of Medical Sciences (24.5%), Shahid Beheshti University of Medical Sciences (10.9%) and other universities (21.8%).

### Reviewing the knowledge questions

The most frequent knowledge score was 5 (58.2%) and the least frequent was 2 (0.9%) with the minimum and maximum of 1 and 7 respectively. Table 1 shows the dentists' answers to these questions. Based on their scores, respondents were divided into weak (scores  $\leq 3$ ), intermediate (scores 4, 5) and good (scores 6, 7). Statistically, there was no significant difference between the two genders' knowledge score ( $P = 0.998$ ). Table 2 illustrates the dentists' knowledge about corticosteroid prescription. Dentists with good scores (7.3%) were unfortunately only in the top quartile, while the

**Table 1. Distribution of dentist's answers to questions about corticosteroid administration in dentistry.**

Question	Response					
	Correct		Incorrect		No response	
	Number	Percentage	Number	Percentage	Number	Percentage
In which condition corticosteroid administration is indicated?	83	75.5	27	24.5	0	0
In which condition corticosteroids can be administered for pain relief?	85	77.3	24	21.8	1	0.9
Which emergency condition does not necessitate corticosteroid administration?	45	41.3	64	58.7	1	0.9
Which corticosteroid should be included in the emergency kit?	105	95.5	5	4.5	0	0
Which side effect is less frequent for corticosteroids?	88	80.7	21	19.3	1	0.9
In what condition corticosteroid administration is considered safe?	20	18.3	89	81.7	1	0.9
In which condition there is a risk of adrenal suppression?	75	69.4	33	30.6	2	1.8

**Table 2. Dentists' knowledge about corticosteroid administration based on the number of correct answers to knowledge questions ( $P = 0.998$ ).**

Knowledge	Gender					
	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Weak (3 or less correct answers)	12	14.6	4	14.3	16	14.5
Medium (4–5 correct answers)	64	78.1	22	78.6	86	78.2
Good (6–7 correct answers)	6	7.3	2	7.1	8	7.3
Total	82	100	28	100	110	100

bottom quartile has mostly consisted of weak scores (14.5%) and the majority (78.2%) scoring was in the middle (Table 2). This questionnaire was designed to assess dentists' basic knowledge about corticosteroids administration including indication, contraindication, and side effects of corticosteroids in the treatment of oral and maxillofacial lesions and in systemic diseases, their usage in emergency conditions, and determination of the possibility of adrenal suppression. Since this basic knowledge is essential in treating numerous oral conditions, the rarity of good knowledge among dentists should be in the forefront of the dental education policy making.

Regarding different dental schools, there was no statistically significant variation between the level of knowledge of dentists graduated from different universities in the country ( $P = 0.151$ ). Likewise, neither age ( $P = 0.481$ ) nor the time passed since graduation ( $P = 0.362$ ) or the amount of work experience ( $P = 0.546$ ) posed any noteworthy effect on this matter. It implies that men and women in different dental schools have almost identical training about corticosteroids administration both as students and after graduation and the dentists' knowledge on this subject did not change by age or increasing work experience.

On the issue of indications and contraindications, the results showed that 24.5% of the participants falsely assume that corticosteroids administration does not have any contraindication in case of herpetic lesions. In total, 13.8% of participants thought that herpetic lesion is healed by topical steroids. These data emphasize that one of the most important issues which should be taught to students

in general dentistry programs is 'corticosteroids should not be prescribed for viral infections such as herpes simplex.' It should be highlighted that corticosteroids are actually immunosuppressant which are not only ineffective in viral infections but also they deteriorate and proliferate the lesions or exacerbate herpes simplex infections.<sup>9</sup> Primary herpetic infection is one of those the diseases often not diagnosed easily, furthermore, the patients are mostly referred to general medical and dental practitioners, therefore, in case of misdiagnosis or insufficient knowledge about the disease, the patient will suffer from side effects.

An additional point indicated by the results is that a substantial percentage of dentists (58.7%) did not have the basic knowledge on corticosteroids administration in emergency cases such as adrenal crisis, anaphylactic shock, and thyroid crisis. This highlights the necessity of introducing proper training for Rasht's dentists on emergency cases. The research results are consistent with the study of Hashemipour in Kerman.<sup>10</sup> Fortunately, 95.5% of the participants correctly pointed to the kind of corticosteroid (hydrocortisone) that should be included in an emergency kit.

Results indicate that 18.3% of the dentists do not have adequate knowledge about the possible complications of corticosteroids consumption and 81.7% are not aware of the potential risks of corticosteroid therapy in systemic conditions. The ever-increasing trend of corticosteroids administration among Iranian dentists and physicians, combined with their lack of knowledge on corticosteroid usage and its consequent complications in systemic conditions such as hypertension, diabetes mellitus, and peptic ulcer, on the one

hand, and increasing life expectancy and aging population, on the other hand, is a recipe for disastrous health issues for the aforementioned graying population.<sup>4</sup> On the subject of adrenal crisis risk, we observed that 30.6% of dentists were not aware of the rule of thumb about corticosteroid substitution before performing dental surgeries. Corticosteroid substitution before dental treatments has been a challenging subject since the first reports about adrenal suppression before surgeries.<sup>11</sup> Recent studies show that it is difficult to determine the possibility of adrenal suppression on the basis of the length of the treatment course, drug dosage, or the time elapsed since receiving the last dosage without laboratory evaluation of cortisol stimulation.<sup>11,12</sup> Therefore, recommendations and related instructions seem necessary to prevent dentists from committing errors in this area.

How to choose the proper medication for effective treatment and understanding side effects and drug interactions are very important for dentists. After antibiotics, analgesic drugs, and mouthwashes, steroids are the most commonly prescribed medications by general dental practitioners.<sup>8</sup> These medications are a double-edged sword in dentistry as the possible risk of these medications goes hand in hand with their therapeutic benefits and their potential side effects sometimes are very severe.

### Reviewing the questions about practice

General dentists often does not have enough accuracy in diagnosis of oral lesions and they often leave them untreated.<sup>13–15</sup> Dentists often prescribe systemic corticosteroids especially injectable form of dexamethasone after endodontic treatment or oral surgery.<sup>16–17</sup> Irrational prescribing of injections is common in Iran.<sup>18</sup> According to the statistics of the National Committee of Rational Use of Drugs (NCRUD), more than 40% of prescriptions have at least one injectable form, and the injectable form of dexamethasone is on the top of the list.<sup>18</sup> The fact that the use of corticosteroids in dentistry should be limited to specific conditions has been confirmed in different studies.<sup>18,19</sup> The patterns of drug prescription of dentists in New York showed that the rate of drug injection was only 1.5%,<sup>20</sup> while it was 20 times higher among dentists of Fars and Ardabil Provinces in Iran.<sup>19,21</sup>

Concerning the frequency of corticosteroid administration in endodontic treatment, 16.4% of the participants have never prescribed and 82.7% of them have rarely prescribed corticosteroid medications.

At the time of corticosteroid administration, 83.6% of the dentists have prescribed them after endodontic treatment.

Related studies imply that corticosteroids should not be widely used in endodontic practices because their immunosuppressive effects may suppress the patient's defense mechanisms, and delay lesion healing.<sup>22</sup> In addition, in most studies, steroids are shown to be an adjunctive treatment that cannot substitute exact endodontic treatments.<sup>23</sup> The present results showed that about 83% of Rasht dentists rarely prescribe corticosteroids in endodontic treatments

and 84% of them prescribe them just after completion of endodontic treatment; it indicates their emphasis on canal cleanup and antimicrobial treatments which is a witness to their acceptable knowledge on this issues. It should be noted that corticosteroids should be prescribed cautiously in bacterial infections.<sup>23</sup> Of course, further research is needed to find out the effects of prior corticosteroid therapy on aggravating the condition and incidence of oral abscesses.<sup>24</sup> Although according to some research, corticosteroids administration as a single dosage some hours before endodontic treatment will be without side effect.<sup>25,26</sup> In contrast, it is documented in other research that patients receiving corticosteroids before endodontic treatments suffer from longer-lasting complications during their treatment, complications such as bone destruction caused by the combination of infection and the corticosteroid-induced immune system suppression.<sup>25</sup>

Regarding supplementary corticosteroid therapy for endodontic treatment, 64.8% of the dentists have prescribed supplementary corticosteroids in necrotic teeth with periapical lesions. The highly successful impact of corticosteroids in pain relief after endodontic treatment of necrotic teeth with periapical lesions has been approved in some studies.<sup>23</sup> Unfortunately, 31.5% of the dentists indicated that they prefer to prescribe corticosteroids in the cases of cellulite and diffused swellings, while studies indicate that corticosteroids should be very cautiously prescribed in severe bacterial infections<sup>26</sup> and generally, there is the possibility of intensification and expansion of infectious complications.<sup>27</sup> Therefore, it is highly recommended that dentists also be further educated in this regard.

On the question of prior prescriptions, 88.8% of dentists have prescribed a single dose of intramuscular corticosteroid, and concerning the duration of treatment with corticosteroids, 89.1% of them have prescribed it only on the day of treatment.

In terms of dosage and the type of medication, 84.3% of the respondents had prescribed dexamethasone injections, and just 9.9% of them have mentioned the dosage (9 out of the 91 who have administered it). The positive role of local infiltration of dexamethasone in reducing pain with less complication has been confirmed in healing vital and necrotic teeth.<sup>11,22,23,28</sup> The most commonly prescribed corticosteroid in Iran is an injection of dexamethasone; moreover, it was shown that more than 22.7% of the total medications prescribed by Iranian dentists are the dexamethasone ampoule (8 mg / 2 mL).<sup>18,19,29</sup> Incorrect use of dexamethasone as a high potency drug with long-term impact can make the patient more prone to complications such as adrenal suppression; therefore, its use should be limited to the short term in severe inflammatory conditions.<sup>3</sup>

There was not any significant correlation between the questions of practice with age, gender, the alma mater, work experience, and passed time since graduation (in all comparisons  $P < 0.05$ ).

### Reviewing the personal opinion questions

All participants agreed with the necessity of knowing about the potency of corticosteroids, the required corticosteroids in dentists' emergency kits, the emergency cases that need corticosteroid therapy, administration of systemic versus topical corticosteroids, long-term side effects of corticosteroids and knowing about the indication and contraindication of corticosteroid usage in general.

Among the participants, 63.6% believed that during the general dental education there was proper training about treatment with corticosteroids, and according to their scores, the same dentists were significantly more knowledgeable on this subject ( $P < 0.001$ ).

However, the vast majority (91.7%) were of the opinion that continuing education programs for corticosteroid administration are subpar, an opinion that should be taken into serious consideration for future planning of said programs. In spite of our perseverance, the rate of complete response to questionnaires was 57.9% (out of 190 dentists, 110 completed the questionnaire); and self-reporting of practice was also one of the research limitations.

## 5. CONCLUSIONS

In this study, most of the dentists had a medium level of knowledge. The results showed that there are imperfections in Rasht dentists' knowledge about corticosteroids administration, complications, and risks of using these drugs as well as their usage in emergency cases; this imperfection can be resolved by changing teaching syllabi in universities, using refresher training, educational workshops, and distributing brochures.

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None declared.

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