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Attitude of Dentists Towards the Administration of Analgesics for Management of Post-Endodontic Pain in Hamadan

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Background: Prevention or management of pain is an important objective in root canal treatment. Post-endodontic pain has always been an important concern for patients and clinicians. Informing patients regarding the possibility of postendodontic pain and drug administration for its management can improve their trust in dentists, raise their pain threshold and increase their tendency to seek further dental treatments.

Objectives: This study aimed to assess the attitude of Hamadan dentists towards the administration of analgesics for the management of postendodontic pain.

Patients and Methods: This descriptive, cross-sectional study was conducted in 2011 in Hamadan city, Iran. Data was collected using a questionnaire including demographic information and questions about administration of analgesics for endodontic patients. All participants filled out the questionnaires anonymously. Collected data was analyzed using SPSS version 16.0 and descriptive statistics.

Results: Eighty questionnaires were completed by dentists. Most dentists reported to use ibuprofen mostly to alleviate mild to moderate and severe endodontic pain in healthy individuals. Only 42 dentists (52.5%) used intracanal medicaments to relieve pain.

Conclusions: The overall level of knowledge of general dentists in Hamadan city about the prescription of analgesics was satisfactory. Dentists should be aware of the latest advancements in their field and maintain their level of knowledge by regularly participating in continuous education programs and accessing relevant scientific resources.

Keywords: Pain; Dentist; Analgesic

1. Background

Prevention or management of pain is an important objective in root canal treatment (RCT). Dental procedures can be performed painlessly by administration of local anesthesia, but postoperative pain occurs particularly in patients who had endodontic pain prior to RCT (1). Postendodontic pain has always been an important concern for patients and clinicians. Its incidence varies from 1.4-40% (2, 3). Some have reported rates as high as 14-25% (4). The incidence of postendodontic pain has been reported as 3-58% in another study (5-7). Even in the 21st century, the general belief is that RCT is painful. For almost all dentists, management of postoperative pain is challenging (4). Postendodontic pain is due to acute inflammation in periapical tissue in response to stimuli from the root canal system into the periradicular tissue (1). This pain is mediated by inflammatory mediators i.e. prostaglandins, leukotrienes, bradykinin and serotonin, which activate the nociceptors and result in central and peripheral hyperalgesia (8, 9). Pain may occur a few hours or even a few days after RCT (10-12). The highest degree of pain has been reported in the first two days post-treatment. In the first seven days, pain intensity gradually decreases to 10% (13). Postoperative pain is not an acceptable sign of treatment success (14). The mechanism of postendodontic pain is complex, but several factors play a role in development of pain including cutting and excavating the pulp tissue, traumatizing the periapical tissue by endodontic instruments and entry of foreign materials into the periapical tissue (4). Medications used for postendodontic pain management include mefenamic acid (4), local corticosteroids (4, 15), intramuscular corticosteroids (4) and a combination of aspirin, ibuprofen and opioids (16). Non-steroidal anti-inflammatory drugs (NSAIDs) like ibuprofen are the most commonly used analgesics for the management of endodontic pain (17). Naproxen is another member

of this family, which inhibits the cyclooxygenase pathway and prevents the release of inflammatory mediators (18). Novafen is a combination of acetaminophen, ibuprofen and caffeine. Acetaminophen affects the peripheral and central nervous systems. Ibuprofen exerts its anti-inflammatory effect via synthesis of arachidonic acid metabolites (19). Informing patients regarding the possibility of postendodontic pain and drug administration for its management can improve their trust in dentists, raise their pain threshold, and increase their tendency to seek further dental treatments (20).

2. Objectives

This study aimed to assess the attitude of Hamadan dentists towards the administration of analgesics for the management of postendodontic pain.

3. Patients and Methods

This descriptive, cross-sectional study was conducted in 2011 in Hamadan city, Iran. The understudy population included all licensed general dentists working in Hamadan city based on an inquiry from the Medical Council of Iran. List of all licensed general dentists working in dental offices in Hamadan was obtained from the Medical Council of Iran. Sampling was census. Data was collected using a questionnaire including demographic information and questions about the administration of analgesics for endodontic patients. The questionnaire was designed based on published articles and its validity had been previously confirmed. All participants completed questionnaires anonymously. Participants were reassured about the confidentiality of their information. Collected data was analyzed using SPSS version 16.0 (IBM, USA) and descriptive statistics (frequency and percentage).

4. Results

Eighty questionnaires were completed by dentists. Of 80 dentists, 42 (52.5%) were males and 38 (47.5%) were females. The mean age of dentists was 32.76 years with a mean working experience of 7.34 years. The frequency of different analgesics administered by dentists to alleviate mild to moderate endodontic pain in healthy individuals was summarized in Table 1.

To alleviate severe endodontic pain in healthy individuals, 47 dentists reported always using ibuprofen, 14 reported always using Novafen and 2 reported always using mefenamic acid. Furthermore, 33 dentists reported often using acetaminophen, 23 reported often using ibuprofen, 9 reported often using Naproxen, 6 reported often using Novafen, 5 reported often using mefenamic acid and 2 reported often using Celecoxib. None of dentists used indomethacin 25 mg or 75 mg.To prevent postendodontic pain, 41 dentists (51.3%) reported administering 400mg ibuprofen a half an hour prior to the procedure, 4 (5%) used 325 mg acetaminophen and 3 (3.8%) used 800 mg ibuprofen a half an hour prior to the procedure. In general, 32 (40%) dentists did not believe that premedication would decrease postendodontic pain and none of dentists used 1000 mg ibuprofen. In total, 42 dentists (52.5%) used intracanal medicaments to relieve pain; 32 (40%) used corticosteroids, 24 (30%) used calcium hydroxide, 22 (27.5%) used phenolic compounds and 2 (2.5%) used chlorhexidine as intracanal medicament for pain relief. In this study, 77 dentists (96.3%) prescribed acetaminophen and 3 (3.8%) prescribed ibuprofen to alleviate endodontic pain in pregnant women. Of participants, 67 (83.8%) used acetaminophen, 5 (6.3%) used ibuprofen, 4 (5%) used aspirin and 4 (5%) used mefenamic acid as analgesics for management of endodontic pain in asthmatic patients. In patients with gastritis or stomach ulcer, 58 (72.5%) dentists used acetaminophen, 11 (13.8%) used mefenamic acid, 6 (7.5%) used ibuprofen, 3 (3.8%) used aspirin and 2 (2.5%) used tramadol for endodontic pain relief. For patients with liver disease, 35 dentists (43.8%) used acetaminophen, 23 (28.8%) used ibuprofen, 15 (18.8%) used mefenamic acid and 7 (8.8%) used aspirin as analgesics for endodontic pain. For endodontic pain relief in patients with coagulation disorders, 64 (80%) dentists used acetaminophen, 9 (11.3%) used ibuprofen, 4 (5%) used mefenamic acid, 2 (2.5%) used tramadol and one (1.3%) dentist used aspirin. In this study, 62 (77.5%) dentists prescribed acetaminophen, 9 (11.3%) prescribed ibuprofen, 5 (6.3%) prescribed mefenamic acid, 3 (3.8%) prescribed tramadol and one dentist (1.3%) prescribed aspirin for endodontic pain management in patients with renal insufficiency. The frequency of prescribed analgesics by dentists is shown in Table 2.

Table 1. The Frequency of Different Analgesics Prescribed for Endodontic Pain Management by Dentists

Drug/Administration	Always	Often	Occasionally	Rarely	Total
Ibuprofen	27	49	1	3	80
Acetaminophen	11	31	16	22	80
Aspirin	0	0	5	75	80
Tramadol	0	0	1	79	80
Indomethacin 25	0	0	0	80	80
Indomethacin 75	0	0	1	79	80
Novafen	1	5	8	66	80
Celecoxib	0	1	6	73	80
Naproxen	0	2	3	75	80
Mefenamic acid	5	5	11	59	80
Total	44	93	52	611	800

Table 2. The Frequency of Different Analgesics Administered by Dentists (Usually in Combination)

Drug/Administration	Always	Often	Occasionally	Rarely	Total
Aspirin	2	2	3	73	80
Acetaminophen codeine and ibuprofen	27	38	6	9	80
Acetaminophen and ibuprofen	10	6	3	61	80
Tramadol	0	0	2	78	80
Total	39	46	14	221	320

No statistically significant association was found between knowledge of dentists about the type and dosage of analgesics and their gender. However, gender of dentists had a significant effect on administration of Naproxen (P = 0.034). Male dentists more commonly administered Naproxen than females. Based on the results, work experience had a significant effect on administration of ibuprofen and acetaminophen codeine (P = 0.00). Dentists with greater work experience less frequently administered ibuprofen and acetaminophen codeine compared to dentists with shorter work experience. However, work experience had no significant impact on prescribing acetaminophen, aspirin, tramadol, indomethacin 25 mg or 75mg, Celecoxib, Naproxen, Novafen and mefenamic acid. Our study results demonstrated that age had a significant effect on administration of ibuprofen (P = 0.032). Younger dentists more commonly prescribed ibuprofen. However, administration of other understudy analgesics including acetaminophen, aspirin, tramadol, indomethacin 25 mg and 75 mg, Celecoxib, Naproxen, mefenamic acid and Novafen was not significantly correlated with age.

5. Discussion

Oral pain is the most common reason for dental visits. Management of postendodontic pain is a major concern in dentistry (2, 3). Our study demonstrated that ibuprofen was the most commonly prescribed analgesic to relieve mild to moderate endodontic pain. Overall, ibuprofen was the most commonly prescribed pain medication. Acetaminophen was reported to be administered occasionally. Indomethacin 25 mg was rarely prescribed. Baghaei et al. and Menhinick et al. reported that ibuprofen was among the most commonly administered drugs by dentists (21, 22). Wells et al. found no significant difference between the analgesic efficacy of ibuprofen and ibuprofen-acetaminophen (23). Worsley et al. demonstrated that ibuprofen was among the most commonly used analgesics by dentists (24). Ibuprofen is considered one of the most efficacious analgesics to alleviate dental pain. Evidence confirms the optimal efficacy of ibuprofen for management of toothache (25). In our study, ibuprofen was the most commonly prescribed analgesic for management of mild-moderate endodontic pain. This finding indicates appropriate drug selection by understudy dentists. Ibuprofen was also the most commonly prescribed drug for severe endodontic pain. Acetaminophen was reported to be “often” administered in these cases. Naproxen was occasionally administered, while indomethacin 25 mg and 75 mg were rarely prescribed. In a study by Baghaei et al., ibuprofen was also the most commonly administered analgesic for severe endodontic pain and was reported to be among the most efficacious analgesics for dental pain relief (21). Turner et al. stated that indomethacin was a suitable drug for dental pain management; however, it is rarely used for this purpose due to its gastrointestinal (GI) side effects (9). Chang et al. and Filaretova et al. reported that indomethacin is not indicated for pain relief due to GI side effects (26, 27). Similarly in our study, indomethacin was not commonly prescribed for the management of endodontic pain. In the present study, 400 mg ibuprofen was the most commonly (51.3%) administered analgesic. Baghaei et al. and Derry et al. stated that 400 mg dosage of ibuprofen was the most suitable medication for dental pain relief (21, 28). Elsewhere, appropriate dosage of ibuprofen for dental pain management has been reported as 400 mg (25). In our study, the most commonly administered dosage of ibuprofen was 400 mg, which is in accordance with the results of previous studies (21, 28). Based on the results of our study, 40% of dentists used corticosteroids as intracanal medicament for pain relief as the most commonly used intracanal medicament followed by calcium hydroxide (30%), phenol (27.5%) and chlorhexidine (2.5%) with lower frequencies. Dodson et al. stated that using corticosteroids in dental procedures decreases pain significantly compared to other methods of pain relief (29). Shantiaee et al. reported that using intracanal corticosteroids is among the most effective techniques to relieve endodontic pain (30). In our study, corticosteroids were the most commonly used intracanal medicaments for pain relief; this finding is in agreement with the results of previous studies (31). In a study by Baghaei et al., calcium hydroxide was the most frequently used intracanal medicament, which is in contrast to our findings. Corticosteroids are believed to be more effective to decrease postendodontic pain in vital teeth (21). Acetaminophen was the most commonly (96.3%) prescribed analgesic for pregnant women in our study. Thornton et al. reported that administration of acetaminophen for pain relief during pregnancy has no side effects for the fetus (32). This finding indicates appropriate selection of this medication for pregnant women by dentists of our study. Acetaminophen was also the most commonly (83.8%)

prescribed analgesic for patients with asthma followed by ibuprofen (6.3%), mefenamic acid (5%) and aspirin (5%) with lower frequencies. According to Gaynes et al., NSAIDs are not used in patients with asthma due to their side effects and complications except for acetaminophen, which has fewer side effects (33). In our study, the most commonly administered analgesic among asthmatics was acetaminophen, which is the correct choice for patients with asthma. In our study, acetaminophen (72.5%) was the most commonly prescribed analgesic for endodontic pain management in patients with gastritis and peptic ulcer followed by mefenamic acid (13.8%), ibuprofen (7.5%), aspirin (3.8%) and tramadol (2.5%). Considering the side effects of ibuprofen and aspirin, acetaminophen seems to be the safest choice for patients with GI problems. Acetaminophen has less GI side effects than other analgesics (34, 35). Therefore, dentists in our study made a correct choice by administering acetaminophen for GI patients. The most frequently administered analgesic for patients with liver disease was acetaminophen (43.8%) in our study, followed by ibuprofen (28.8%), mefenamic acid (18.8%) and aspirin (8.8%). Considering the hepatic side effects of ibuprofen and aspirin, acetaminophen appears to be the right choice of analgesicsin hepatic patients for dental pain relief (26, 36). In our study, dentists used acetaminophen for dental pain alleviation in hepatic patients, which is in accordance with previous studies (26, 36). In our study, acetaminophen (80%) was the most frequently prescribed analgesic for endodontic pain in patients with coagulation disorders, followed by ibuprofen (11.3%), mefenamic acid (5%), tramadol (2.5%) and aspirin (1.3%). Sarici and de Vries mentioned that aspirin and ibuprofen could cause adverse reactions in patients with coagulation disorders, while acetaminophen is safe for them (37, 38). In our study, most dentists reported prescribing acetaminophen for dental pain relief in patients with coagulation disorders, which is similar to the results of previous studies (37, 38). In our study, the most frequently prescribed painkiller for endodontic pain in patients with renal insufficiency was acetaminophen (77.5%) followed by ibuprofen (11.3%), mefenamic acid (6.3%), tramadol (3.8%) and aspirin (1.3%). Considering renal side effects of ibuprofen and aspirin discussed in studies by Chavez-Flores and Lanes, acetaminophen is used for pain relief as the analgesic of choice for patients with renal insufficiency (39, 40). In our study, most dentists prescribed acetaminophen for these patients, which is in agreement with previous studies (39, 40).

When prescribing a combination of two analgesics, most understudy dentists recommended a combination of acetaminophen and ibuprofen. Evidence shows that combined use of ibuprofen and acetaminophen has a superior analgesic efficacy and relieves pain more efficiently (41). Baghaei et al. also reported that ibuprofen plus acetaminophen was the most commonly prescribed drug combination (21), which is in accordance with our results. For most drugs, no statistically significant association existed between the knowledge of dentists about the type and dosage of prescribed medication and their gender. However, gender had a significant effect on administration of Naproxen ($P < 0.05$); this drug was more commonly prescribed by male dentists. Baghaei et al. failed to find a significant difference in administration of analgesics between male and female dentists (21). Based on the results of the current study, work experience of dentists significantly affected the administration of ibuprofen and acetaminophen codeine. Dentists with greater work experience less commonly prescribed ibuprofen and acetaminophen codeine. However, work experience had no effect on prescription of acetaminophen, aspirin, tramadol, indomethacin 25 mg and 75 mg, Celecoxib, Naproxen, Novafen or mefenamic acid. Baghaei et al. demonstrated that dentists with greater work experience prescribed ibuprofen less frequently, which confirms our findings (21). Within the limitations of this study, the results demonstrated that the overall level of knowledge of general dentists in Hamadan city about the prescription of analgesics was satisfactory. Most dentists used ibuprofen to alleviate mild to severe endodontic pain, which is in accordance with textbooks and dental literature. All dentists used acetaminophen for pain relief in patients with systemic conditions, which indicates their intention of using the safest medication to reduce the risk of possible side effects or complications. Dentists should consider the latest advancements in their field of work and maintain their level of knowledge by regularly participating in continuing education programs, reading new guidelines and accessing relevant scientific resources.

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Authors' Contributions

Study concept and design: Shokoufe Jamshidi; Acquisition of data: Fahime Baghaei; Analysis and interpretation of data: Alireza Jalalvand; Drafting of the manuscript: Shokoufe Jamshidi; Critical revision of the manuscript for important intellectual content: Zakie Doniavi; Statistical analysis: Saeid Moosavi; Administrative, technical, and material support: Shahrbanou Radi; Study supervision: Shahrbanou Radi.

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