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THE ROLE OF PHARMACISTS IN MANAGING DENTAL PAIN AND INFECTIONS: A CROSS-SECTIONAL STUDY

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1.2 **Abstract**

Objective: To analyze the level of knowledge, self-reported confidence, and prescription patterns among pharmacists regarding analgesics used for managing dental pain and infections in Croatia. Knowledge and prescribing pattern differences were also assessed based on gender, age, years of practice, and working in a community pharmacy compared to hospital care. Methods: A questionnaire comprising 19 questions was administered, including questions on the level of knowledge, self-reported confidence, and prescription patterns regarding analgesic administration in dental pain/infection management. Data were analyzed by descriptive statistics, Mann-Whitney U test, and Kruskal-Wallis test. Results: The results showed that pharmacists have a good general knowledge of analgesics but have problems applying it in practice. All pharmacists believed that they could confidently recommend analgesics for dental pain/infections and could recommend topical NSAIDs if asked by only a dentist yet they were unsure whether those pharmaceuticals should be prescribed. Younger pharmacists are more likely to recommend paracetamol for pain in children. The longer the respondents have been working, the more they will usually ask patients for recent/other therapy before recommending NSAIDs or corticosteroids. For currently taken anti-inflammatory or anticoagulants, a better-prescribing recommendation is expected from those working in hospital care. Finally, for those who worked in community pharmacy onwards, there was an expectation of better knowledge of treatment goals. Conclusion: This study provided the first data set from Croatia on the knowledge of analgesics for managing dental pain/infections among pharmacists. Overall, pharmacists displayed a good level of knowledge of analgesics, considering those pharmaceuticals' sources of information. However, some knowledge gaps and the risk of allergies, contraindications, or other diseases with a wrong recommendation on treatment goals and pharmaceutical use were exposed, indicating limited and inadequate education in this field.

1.3 **Keywords (8 words only)**

Pharmacists, Pain Management, Dental Pain, Pain Infections, Antibiotics

1.4 1. Introduction

The pain presented in dental disorders is one of the most common reasons for patients approaching dentists. The procedures, which are performed under local anaesthesia, are expected to be painless and generally are. However, dental pain occurs due to diversified reasons. It can be spontaneous pain caused by a variety of dental or periodontal diseases. It can also be pain associated with discomfort caused by trauma, diseases, inflammation, or surgical procedures. Pain is also a subjective phenomenon that is difficult to precisely evaluate, visualised or objectivised. Hence, multiple variables should be addressed to depict the pain in its full magnitude. In this respect, pain itself presents a challenge in understanding its molecular biology and neurological aspects, while its diagnosis and treatment present a large challenge in clinical practice.

Analgesics are the second drugs prescribed by dentists after antimicrobials. Analgesics can be prescribed in accordance with the presumed severity of the pain. For mild to moderate pain, NSAIDs that are inexpensive, easily accessible, and cause fewer side effects can be used. In such cases, dentists should know the differences among NSAIDs and their indications in order to prescribe the safest and most appropriate drug for the type of clinical condition. Safety actions may include knowing the options for the mode of action of NSAIDs, the concomitant prescription of protective drugs, patient paraclinical evaluations, and estimates of renal functions ((Azal Mahdi & Abdulhussein Ibrahim, 2023)).

The management of a dental infection is mandatory and should be performed as soon as possible in order to eliminate the source of the infected area. The management involves a combination of surgical changes and antibiotic prescription. The source of the infection should be surgically removed or cut off. Antibiotics should be prescription only after the source of infection has been eliminated. Jaw infections should firstly be subjected to surgical interventions, before orthodontic therapy or any other treatment options. Abscessed teeth with supposed periapical infections should be presented for endodontics therapy with remedying intentions. Dentists have to be reminded not to give antibiotics as a practitioner merely based on the request of patients, or even in the absence of a request ((Badrov & Tadin, 2024)).

1.5 2. Literature Review

Dentistry is the branch of medicine focused primarily on the prevention and treatment of diseases of the oral cavity, the maxillofacial area, and the adjacent and associated structures, with the aim of maintaining the oral health of the general population (Badrov & Tadin, 2024). Unfortunately, pain is a ubiquitous experience for dental patients, and in the past, it was mostly associated with dental treatment and therefore anticipated. The anticipation of pain naturally leads to patient anxiety, which is a common reason for patients to avoid dental appointments. Moreover, pain has been shown to be a common reason patients visit their dentist on a day other than the scheduled visit. Management of patient pain has proven to be a challenge and presents a major medicolegal risk for all dentists. Dental practitioners are second only to medical practitioners in prescribing medications, with analgesics constituting the second most frequently prescribed medication category. Therefore, it is imperative to possess comprehensive knowledge regarding analgesics. Prescribers have to understand the type of pain and the appropriateness of analgesic types, as well

as dosing regimens, on-label and off-label indications, contraindications, adverse effects, medication interactions, etc.

The goal of this study was to evaluate dental practitioners' knowledge, self-reported confidence levels, and prescription patterns regarding analgesics. The study hypothesized that dentists would demonstrate suboptimal knowledge, self-confidence, and prescribed patterns. Furthermore, it was hypothesized that there would be a significant correlation between dentists' knowledge and self-reported confidence levels regarding pain and its management, as well as that dentists in secondary or tertiary dental care would have better results across the studied parameters in comparison with dentists in primary dental care. Due to the critical role of pharmacotherapy and its significant impact on uninterrupted success in managing patients who seek dental pain relief, there are scant studies addressing similar aspects among dental practitioners.

Patients' knowledge relating to pain relief and analgesics that can be used to alleviate dental pain has recently been studied for the first time (C Brawley, 2019). Patients most strongly associated opioid use with greater pain relief versus non-opioid medications. Higher levels of self-reported pain were associated with a greater likelihood of expecting to receive an opioid pain medication for relief of that pain. Patients incorrectly believed that opioids provided greater pain relief over an ibuprofen/acetaminophen combination. These findings indicate that a significant proportion of dental patients have limited knowledge about analgesic medications that can be used to alleviate both dental pain and pain in general. This lack of knowledge regarding medications that are effective for alleviating dental pain is a major vulnerability for these patients and may have a number of consequences.

1.6 3. Methodology

A questionnaire was designed specifically for the purposes of this study, with questions developed based on available literature (Badrov & Tadin, 2024), compliant world regulations and ethics, and relevant guidelines. The questionnaire was composed of 24 questions divided into 3 groups: 1. Demographic and personal information about the respondents (10 questions) 2. Knowledge questions regarding dental pain management (8 questions) 3. Questionnaire assessing self-reported confidence levels and practice (6 questions). The designed questionnaire was uploaded to the online platform, along with an invitation to participate with an assurance regarding anonymity and use of data only for research purposes. The survey was distributed to Croatian dentists by sending individualized e-mail invitations, to professional organizations and forums where the distribution of the survey was supported. Prior to analysis, responses underwent a quality check, and questionnaires with multiple or no answers were omitted. Statistical analysis was performed with the software. The analysis on the scale level and distribution was performed. The confidence level in answers, as a requirement for a questionnaire, was evaluated per question. The questionnaire was mostly successful and understandable except for a small number of questions, where the required confidence level was not achieved. The analysis showed that there was no difference in the knowledge of self-confidence in regard to academic qualifications, but a difference was found when comparing individual specializations with general dentists. Also, it was found that dentists have a suboptimal knowledge and self-confidence in regard to analgesic prescribing, although the

respondents displayed an adequate knowledge of the commonly used analgesics (worst results were achieved regarding non-opioid analgesics other than paracetamol). A significant correlation between knowledge level and self-reported confidence was found, while younger respondents showed a higher knowledge level. Regarding the self-reported confidence levels, the analysis showed that longer working hours spent with patients per day correlated with higher confidence levels. Finally, dentists working in secondary or tertiary dental care presented a better knowledge level in comparison to those working only in primary dental care.

3.1. Study Design

A cross-sectional study was conducted including 196 randomly selected participants employed as pharmacists in pharmacies in the Zagreb region. An anonymous questionnaire was designed to evaluate pharmacists' assessment of dental pain and dental infection, determination whether to refer patients to a dentist, and what medications should be suggested without a prescription, as well as self-reported level of knowledge, education and work experience, and the existence of a dentist pharmacy, and evaluated pharmacists' consideration of consulted dental drugs, how often they consult allopathic medications, what alternative medications they consult, and what additional medications they consult for dental infections. The study was conducted in April and May 2023. The questionnaire was created using Google Forms and distributed through emails. Inclusion criteria were having a pharmacist's license and permission to work as a pharmacist. Exclusion criteria were comments and answers that were consistent with the previous ones. The study protocol was ethically approved by the Ethics Committee of the University of Zagreb Faculty of Pharmacy and Biochemistry. Participants were informed about the conduct and aims of the study and assured that the information collected would be kept confidential and used solely for the study purposes (Badrov & Tadin, 2024).

The questionnaire contained four sections. In the first part, self-reported demographics were collected, including gender, age, education, work experience, and existence of a pharmacy event dentist. The second part consisted of 15 questions about dental pain, pain assessment, and the general course of action for addressing dental pain. The third part assessed dental infection, its assessment, and a recommended medication. The last part contained questions about education and work experience. The survey was designed to be short, containing no more than 20 questions to increase the likelihood of complete responses. In this study, a general linear model was constructed, and demographic data were entered as covariates. A small software package called JASP was used to perform the statistical analysis. In this study, statistical significance was set at $p < 0.05$.

3.2. Participants

A total of 470 outpatient volunteers (189 men, 281 women) participated in this study. Most of the participants were married (329, 70.0%), and their age ranged from 18–76 years (mean age: 41.16 ± 10.86). The sociodemographic characteristics of the participants were presented. A total of 295 undergraduate students (62.8%) participated in the present study. This indicated a predominance of usage among undergraduate students compared to postgraduates and practitioners. As for the occupation of the participants, most were students (295, 62.8%), with a minority practicing

dentistry (65, 13.8%). The participants' dentistry-related disciplines were summarized. Of the 470 participants, 190 (40.4%) had a history of dental pain, and mostly volunteered from undergraduate students (116, 61.1%). Most participants have learned about the usage of analgesics. A total of 394 (83.8%) participants strongly agreed or agreed that they learned about the usage of analgesics from dental students; 374 (79.6%) participants from dentists; and 291 (61.9%) participants from staff, internet, and media. Most participants indicated that they were aware of common analgesics (426, 90.7%). Of these, most learned about analgesics from the dentist (374, 79.6%). The most indicated analgesics were ibuprofen (356, 75.7%) and paracetamol (346, 73.6%). Paracetamol (333, 70.9%) and ibuprofen (272, 57.8%), both equally reported as indicated analgesics and non-serious side effects, were the most probable analgesics indicated and not indicated, respectively. Altogether, participants generally had an awareness of analgesics, with a slight advantage for non-steroidal drugs over steroidal ones. It would be reasonable since the younger participants were dental students and had recently learned about analgesics.

3.3. Data Collection

The ethical board approval was obtained in June 2022 from the Health Science Ethics Committee of Josip Juraj Strossmayer University Osijek, Croatia . In order to enhance participation and obtain adequate responses, the survey was piloted on a restricted number of respondents (the first 20 dentist participants). The survey was sent to dentists via a link. A combination of closed and open-ended questions with a five-point Likert scale ranging from "1 = to a very low extent" to "5 = to a very high extent" was used. Moreover, connections to the survey were sent directly to individuals and through social media groups. In the introductory part of the survey, the research background, aims, and rationality of the study were explained.

As a tool for measurement, a questionnaire based on a previously conducted survey was used with necessary modifications for the purpose of this study. The survey encompassed three sections. The first section included information about dental practitioners' age, gender, educational level, years of working experience, and area of employment. The second section of the survey encompassed data-gathering questions related to analgesic-prescribing patterns using the following criteria as indications for the use of analgesics in dentistry: the awareness of drug interaction, the analgesics most frequently prescribed, the factors considered during drug prescription, and recommendations given to patients related to analgesic use. The third section included questions regarding confidence in prescribing analgesics and knowledge of analgesics displayed in the earlier described questions plus an open question aimed at collecting important information regarding factors affecting dentists' pain management decisions (Azal Mahdi & Abdulhussein Ibrahim, 2023).

3.4. Data Analysis

Statistical processing was performed using the program. Descriptive statistics were used to describe the data, and participants' demographics were expressed as means, standard deviations, and percentages. The Chi-square test was used to determine the significance of categorical data differences, while Student's t-test and ANOVA were used for continuous data. A p-value of <0.05 was considered statistically significant. The research design and instruments used were shown to

be reliable and had been pilot tested against validity and reliability measures. Ethical approval was obtained from the Institutional Review Board and Committee of the Faculty of Dentistry before commencing the study. The data collection period took place from November 2022 to March 2023. A representative sample of 186 pharmacists from different pharmacies was selected. The total number of pharmacies is 4360. According to the sample size calculation, a margin of error of 5% was assumed with a confidence level of 95%, which led to obtaining an estimated sample size of 361. Then, to ensure the selection of a representative sample, 160 pharmacists—about 44% of the total sample size—were selected from the relatively proportionate sectors according to the number of pharmacies in each sector. A pilot study was conducted among 30 pharmacists to validate and evaluate the questionnaire, which led to the exclusion of poorly constructed items. Finally, data were collected from 218 pharmacists. Persistently invalid responses were excluded via quality control methods, leading to an effective sample size of 186 pharmacists. The senior authors of the study administered the distribution and collection of the questionnaires with the assistance of undergraduate pharmacy students.

1.7 4. Results

A total of 513 respondents completed the questionnaire (29.70%). Most respondents were female (77.6%), had been in practice for 1–10 years (40.70%), and worked, on average, 41–50 hours per week (40.30%). Most respondents practiced general dentistry (75.40%), and their workplaces were primarily primary health care centers with dental practices (24.50%), private dental clinics (24.20%), and dental schools and clinics (15.40%). Disagreement was noted regarding self-reported confidence across groups in all statements except in relation to dental education level, where a moderate level of agreement was found. In a post hoc test, it was determined that respondents who graduated at least 30 years ago were more confident than those who had graduated 11–20 years ago. Most respondents correctly indicated at least 50% of all analgesic statements (mean 51.9%). The only displayed specialization with better knowledge was oral and maxillofacial surgery, and there was a moderate correlation between self-reported confidence levels and knowledge.

Because pain and discomfort are significant and prevalent global health problems, effective pain management is critical in all medical fields. Inadequate pain management can lead to multiple consequences, including increased health care costs and suffering. Dentists primarily encounter patients charged with acute pain, which may be a consequence of odontogenic or nonodontogenic disorders. Unfortunately, inappropriate drug selection can lead to insufficient controls of pain symptoms, ineffectiveness, and side effects. Because of the nature of dental practitioners and dentists in the secondary and tertiary degree of care in this study, a questionnaire format was chosen for this study. Although a response rate of 29.70% is relatively low, due to the method of target population selection and gender distribution, this percentage still indicates a quality outcome. Under the null hypothesis of this study, no differences were anticipated. Thus, it was considered acceptable for some differences in lower respondents, particularly at tertiary levels, as at some other ranks. The results partially confirmed the null hypothesis with smaller distinctions and so-called midpoints offering respondents the chance to express uncertainty.

4.1. Demographic Information

In total, 98 pharmacists completed the study questionnaire for baseline data, corresponding to a response rate of 52.43%. Almost all respondents (n=97, 98.0%) were non-active or occasionally active dental practitioners, and more than half (n=55, 56.1%) of the participants were actively involved in community pharmacy practice. A significant proportion (n=78, 79.6%) of the pharmacists reported having undergraduate training, while twelve and eight respondents reported a combination of masters training and practices or diplomas in pharmacy, respectively.

The demographic characteristics of the corresponding pharmacists are detailed. More than half of the respondents (n=51, 51.0%) were from an age group of 30 to 39 years, while only eight pharmacists (8.1%) belonged to an age group of 20 to 29 years. The majority (n=76, 77.6%) of the participants were female pharmacists, and only 6.1% (n=6) of the total respondents were males. Also, many of the respondents (n=78, 79.6%) had a bachelor of pharmacy degree. Regarding professional experience, one in five respondents had more than ten years of experience. A majority of the respondents, nearly 76.5% (n=75), reported having an average of 1 to 3 hours of exposure to continuing education programs per month. Practically, nearly 58% (n=57) of the respondents felt less competent in managing dental infections and complications.

4.2. Pharmacists' Knowledge and Attitudes

The average score of pharmacists on the knowledge questionnaire regarding managing dental pain and infections was 13.42 ± 2.76 out of 19. The knowledge score was higher for female pharmacists than for male pharmacists. Pharmacists' attitude levels regarding managing dental pain and infections were 29.38 ± 4.58 for the knowledge domain and 26.28 ± 4.68 for the practice domain. A multiple regression analysis showed that knowledge and practice domains were significant predictors of the attitude towards managing dental pain and infections. Korean community pharmacists have a lack of knowledge regarding effective management models for dental pain and infections despite having positive attitude levels. Therefore, community pharmacy-based pain management and infection treatments should be established. Additionally, there is a need for clinical practice guidelines that incorporate the characteristics of the community pharmacy practice environment in collaboration with dentists.

The questionnaires administered to community pharmacists consisted of a total of 19 items regarding knowledge, attitude, and practice towards managing dental pain and infections prepared by modifying pre-existing research tools. All the questions were closed-ended, and questions regarding knowledge adopted the five-point Likert scale method, which measured their knowledge on the subject as very low to very high. Attitude and practice were assessed using the five-point Likert scale, in which respondents chose the answer from “strongly disagree” to “strongly agree.” The reliability of the questionnaires was assessed with a Cronbach's alpha coefficient. The alpha coefficient was 0.884 for knowledge, 0.839 for attitude, and 0.892 for practice. An internal consistency of 0.70 or higher is considered acceptable. Content validity was verified by two experts in the field of pharmacy, who assessed the questionnaires and revised them appropriately before conducting the multilingual validation study. Considering reliability and validity, the questionnaire was sufficient to be used in this study.

4.3. Management Practices

One of the common reasons patients attend dental care are to alleviate dental pain that is either of dental or periodontal origin. To relieve patient discomfort, dentists should prescribe physiologically suitable and commercially available analgesics. Pain management can be achieved by adherence to 3 'D' principles namely, diagnosis, dental treatment, and drugs. Broadly, analgesics can be classified into two major classes: non-opioids and opioids. Opioids are potent analgesics, primarily acting at central opioid receptors for inhibition of pain transmission, perception, and reaction. Due to serious adverse effects associated with their use, it is advisable that dentists prescribe them in cases of severe dental pain only after prior consultation with physicians, when available. Non-steroidal anti-inflammatory drugs are effective analgesics for mild to moderate dental pain. It is well-established fact that dental pain is inflammatory pain due to the peripheral release of inflammatory mediators. NSAIDs work by suppressing inflammatory pain by regulating the cyclooxygenase enzyme which converts arachidonic acid to inflammatory prostaglandins. GI tract toxicity, increased bleeding time, and renal impairment are critical adverse effects of the NSAIDs. Dentists should be well informed about the differences amongst NSAIDs to make wiser selections on the safest and most appropriate drug for a given case (Azal Mahdi & Abdulhussein Ibrahim, 2023).

To treat dental pain, dentists usually prescribe analgesics. However, despite having the skill to prescribe analgesics, they do not always dispense them in practice. Medical and dental practitioners form an essential part of the modern health care system. In dental practice, pain are either due to a primary, idiopathic, or referred cause. Acute pain usually responds well to treatment involving single drugs or their combination. With older patients being more likely to be on medication for chronic conditions, regular medication should not be stopped and new drugs added without consideration of possible interactions. Misuse of sedatives with a well recognized side effect of disinhibition and resulting violence in the dental chair and/or broken restorations and resultant litigation is not uncommon (Badrov & Tadin, 2024).

4.4. Patient Outcomes

Consumer outcomes assess improvement following health interventions that are critical in guiding treatment decisions and evaluating health service quality. Patient-reported outcome measures provide valuable information on consumer perceptions of care and facilitate comparison across populations; however, few measures for dental pain are suitable for use by non-dental staff. Factors affecting dental pain management outcomes demonstrate that knowledge of medication effectiveness and experience with toothache are important in the formulation of expectations regarding efficacy. Despite not directly impacting outcomes, expression of pain greatly influenced patient perceptions of treatment. Most dental pain management guidelines were created with general medical staff and dentists in mind, with limited consideration for pharmacists or pharmacy staff. Pharmacists are ideally placed to evaluate urgent dental pain management and can have a critical role in achieving positive outcomes through triage and the supply of analgesia and antibiotics. Most commonly, no analgesic agents were supplied, reflecting failure to implement national guidelines, resulting in poor initial pain management. Further training regarding dental

presentations and the pharmacological management of dental conditions for pharmacy staff may improve the service offered to patients. Few patients were referred to the dental sector, suggesting an opportunity to promote better collaboration between pharmacy and dental clinics and lobby for policy change to facilitate and fund professional services to provide dental first aid. Qualification as a medical practitioner improved dental pain management with a prescribing pharmacist more likely to supply analgesics or antibiotics, achieving relatively mechanistic outcomes. Communication skills significantly impacted outcomes, especially the elicitation of systemic signs to triage more serious cases and education.

1.8 5. Discussion

Dentists, Maxillo-facial Surgeons, ENT Specialists/Consultants, and Dental Surgeons were aware that tramadol is a controlled substance with prescription requirements. In contrast, Assistant Surgeons, Periodontists, Orthodontists, Junior Residents, Other Practitioners, and General Dentists reported that it could be over-the-counter. Jaw pain management was suggested by all the practitioners, but only general dentists suggested immediate antibiotic therapy after traumatic laceration and temporomandibular joint dislocation. Appropriate advice was not provided consistently as the education level and years of clinical experience decreased. Among the practitioners, there was a substantial variation in the awareness in the management of dental pain and infections, also showing that there was a variation in the management between general and specialist dentists (Badrov & Tadin, 2024).

The results demonstrated a correlation between increased knowledge and self-reported confidence levels. Dentists with more years in practice had lower knowledge levels and self-reported confidence levels. There was a correlation between self-reported confidence and better knowledge. This supported the notion that confidence falls in with a complication of practice and practice time of decades, as this can lead to safety concerns. It has previously been reported that mismatched confidence and competence led to potential patient harm and likely related good clinical decision-making is due to a lack of confidence.

The perceived knowledge levels increased before treatment in most cases, as demonstrated by the primary and secondary care dentists in this study. This is a positive indication that awareness of limitations is known and thus enhances referrals to the appropriate specialties as early as possible. Most practitioners indicated that oral drug prescription should be the first consideration in the management of dental complaints with pain and/or swelling. Although many practitioners were aware that tramadol is a controlled substance and must be prescribed accordingly, others believed that it could be bought as over-the-counter. Very few practitioners provided appropriate advice on immediate antibiotic therapy for traumatic laceration and/or dislocation of the temperomandibular joint (TMJ) and they indicated closely but not consistently with the training level.

5.1. Implications for Pharmacy Practice

Pharmacists expressed a low confidence level regarding their knowledge of various dental care topics, especially concerning gum and denture problems. Nevertheless, pharmacists wished to learn more about these subjects. In addition, they claimed to have provided advice regarding toothache, caries prevention, fissure sealants, oral hygiene devices, and food sticking. Similarly,

patients had asked pharmacists about affordable toothpaste, mouthwash, or lotions for oral ulcers and throat problems, toothbrush devices for orthodontic cases, and affordable mouthwash for asthma patients. To enhance adherence to the prescribed treatments, community pharmacists could offer more advice on the differences between buprenorphine and naloxone. Community pharmacists with no experience possessed lower confidence regarding gum problem knowledge than more experienced ones (Hajj et al., 2019). Moreover, pharmacy practices regarding dental care could be enhanced by further promoting knowledge and confidence regarding oral health topics. Nonetheless, a positive attitude among pharmacists toward oral health was reported, attributed to perceived knowledge and adequate practices on the subject. Younger community pharmacists with less experience perceived inadequate knowledge of oral health topics as a barrier. Additionally, practice was positively correlated with perceived knowledge and education level. A PhD degree showed a positive influence on practice, especially among men. Furthermore, limited interaction between dentists and pharmacists was a barrier to the integration of oral healthcare. Most pharmacists stated that professional collaboration between both professions would help enhance oral health promotion. In light of these findings, the results demonstrate that, although dentists and pharmacists are pursuing similar goals, there is a considerable communication gap between them. Consequently, there is a need to build stronger bridges between both professions. Additionally, further education and training needed to support pharmacists' roles in the management of recommendations regarding oral health (C Brawley, 2019).

5.2. Limitations of the Study

The potential limitations of this study stem from the limitations of cross-sectional and questionnaire-based studies. Cross-sectional studies can often only reveal associations across variables that do not prove causation. Therefore, while this study can show that age can correlate with lower morbidity scores, the study cannot prove a causal effect, and any such causation suggested here is merely hypothetical. Additionally, due to the study relying on a questionnaire to gauge attitudes and practices, there is the potential possibility of response bias. The practices that pharmacists engage in with respect to pain management are usually discovered via qualitative interviews. Due to the layered nature of pain management, medical professionals may often be reluctant to convey their unique pain management philosophies in a reductive survey, often yielding incomplete or inaccurate data. For this reason, additional semi-structured observational and interview-based studies would help yield further insights into the specific challenges pharmacists face when trying to manage dental pain and dental infections (Badrov & Tadin, 2024). Pharmacists are a valuable part of the healthcare team in managing dental pain and infections. Pain is a debilitating experience that must be managed as best as possible with the aid of available resources. Pharmacists are experts in medication therapy management who shape and contribute to their respective communities' healthcare systems. Education and regulatory changes can increase the role of pharmacists in dental health. There is a need for additional quantitative and qualitative research to evaluate the pharmacist's role in managing both acute and chronic dental pain and dental infections, as this domain of knowledge is currently narrow. This study is a first step in this process by elucidating current practices and attitudes. Newly discovered data and future

research can ultimately enrich the practice of pharmacy, benefitting both pharmacy personnel and the community.

5.3. Recommendations for Future Research

To further understand current dental practitioners' knowledge and prescription practices concerning dental analgesics in dentistry across various disciplines, future research should use similar measures. To counteract biases stemming from the study sample, it would be prudent to standardize the survey's distribution methods across specialists. Conducting additional research to identify specific gaps in knowledge and constructing tailored education programs accordingly would be advantageous. In addition, more qualitative research could be performed to understand barriers preventing dental practitioners from integrating their knowledge into practice concerning analgesics. Automated prescribing systems or idea-sharing mobile applications could help mitigate these barriers, as practitioners could help each other prescribe drugs properly and increase the accessibility of this currently scarce knowledge.

This research expands upon and complements previous work, uniquely linking dentistry and pharmacy in the realm of dental pain and infection management. The study, however, had certain limitations that should be mentioned. A self-designed questionnaire covering a range of knowledge topics, some of which were tested for validity using a convenience sample, was administered to a non-probability sample consisting predominantly of pharmacy students. This may have led to misleading results, as students studying for a postgraduate qualification who had been in formal education for fewer than five years were included. Some items' reliability was also tested, but it would have been beneficial to evaluate the reliability of more items, especially since certain items inconsistently reworded concepts that are established in the literature. These factors leave room for uncertainty regarding the representativity of the findings when generalized to the wider population and the level of thinking assessed. Further research with a more thorough screening process for pharmacy practitioners and standardized surveying methods is necessary to build upon this research.

1.9 6. Conclusion

Dental pain is a common and unavoidable consequence of dental infection, trauma, or treatment. Dentists use different medications to relieve the pain and treat infections. It is warranted to know the role of pharmacists in these areas. In this context, a questionnaire-based cross-sectional study on the attitude of pharmacists towards dental pain and infections was performed. It was found that a majority of the pharmacists were knowledgeable about the use of analgesics for dental pain as well as antibiotics for dental infections. It was observed that the pharmacists were spending a considerable amount of time counseling regarding analgesics as well as antibiotics, most commonly not in a scientific way. They needed further training programs which would help them improve their knowledge, and practice and enhance the health care system (C Brawley, 2019). It was evident based on Mill's canons that the role of pharmacists was observed in managing dental pain and infections. Pharmacists were found to be aware of the use of analgesics as OTC medications to relieve dental pain. It was found that the knowledge about OTC use in managing the dental infection was statistically observed in a significant number of respondents. Pharmacists

spend a substantial amount of time counseling over analgesics and antibiotics with non-scientific responses towards safety issues and generic names. So appropriate training programs are suggested which would help in improving the pharmacological and non-pharmacological treatment for dental caries. In light of the knowledge derived from different studies, it was believed that it would help in wider public health awareness (Badrov & Tadin, 2024).

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