Pain Management during Orthodontic Treatment in Western Indonesia: A Cross-Sectional Study

Dhea Putri Febriannavisha[1]*, Avi Laviana[2], Gita Gayatri[2]

1. Undergraduate Study Program, Faculty of Dentistry, Universitas Padjadjaran, Indonesia.
2. Department of Orthodontics, Faculty of Dentistry, Universitas Padjadjaran, Indonesia.

Abstract

Nearly all patients undergoing orthodontic treatment experience orthodontic pain. The pain can interfere or even be a reason for patients to discontinue the treatment. It is crucial for every dentist to alleviate the pain as much as possible. This study aimed to determine the most preferred method for managing orthodontic pain following fixed and removable appliances activation by dentists in Western Indonesia.

This is a qualitative-descriptive cross-sectional study. The sample was obtained by purposive sampling technique, resulted in 146 dentists, comprised of 54 general dentists and 92 dental specialists. The study was conducted using cross-culturally adapted questionnaire from a study in Iraq. Data obtained were converted into percentages.

Majority of dentists (53%) preferred combination of non-pharmacological and pharmacological methods for managing orthodontic pain. The most preferred non-pharmacological methods were psychological perspective, behavioural management, and telephone follow-up (63%), whereas that of pharmacological method was prescribing mefenamic acid and paracetamol (49%).

The most preferred method for managing orthodontic pain following fixed and removable appliances activation by dentists in Western Indonesia was combination of non-pharmacological and pharmacological methods.

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Introduction

Pain, resulting from tooth movement, is a common clinical symptom experienced by patients undergoing orthodontic treatment.[1,2] Approximately 91-95% of orthodontic patients experience pain throughout their treatment.[3] Pain is one of the most cited adverse effects from orthodontic treatment and a major concern for both patients and dentists.[4] The pain often causes patients to become indifferent towards treatment outcomes and stop cooperating by not wearing appliances or auxiliaries, such as elastic bands, not maintaining good oral hygiene, and serves as the main cause for missing appointments.[5–7] Moreover, several studies have shown that approximately 8% of patients considered pain as one of the major reasons for discontinuing orthodontic treatment.[8]

Pain induced by orthodontic appliances, whether fixed or removable, is often described as a sensation of pressure.[9] The pain experienced by patients after the activation of fixed and removable appliances exhibits a distinct pattern. Pain level in the initial phase of treatment using fixed appliances was low, then increased by 300-500% and peaked between the first and third day. Following the peak, pain level gradually decreases over the subsequent 4-5 days and eventually becomes minimum. Likewise, pain level in the initial phase of treatment using removable appliances was low, then increased by 50-100% and peak after the first or second day. Pain level subsequently decreases over the remainder of the first week and becomes minimum by the seventh day.[10]

It should be every dentist's objective to minimize orthodontic pain as much as possible, albeit it is impossible to remove the pain completely.[11] Various methods have been developed to reduce the pain arising from

*Corresponding author:
Dhea Putri Febriannavisha,
Undergraduate Study Program,
Faculty of Dentistry, Universitas Padjadjaran, Indonesia.
E-mail : dhea19005@mail.unpad.ac.id

orthodontic appliances. These methods are broadly grouped into two main approaches, that is pharmacological and non-pharmacological.[12]

Pharmacological approach for alleviating orthodontic pain uses analgesics, mostly non-steroidal anti-inflammatory drugs (NSAIDs) which act by inhibiting prostaglandin synthesis, hence relieving pain.[13–19] Non-selective NSAIDs, such as ibuprofen and aspirin, inhibit cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2) isoforms, causing gastrointestinal, cardiovascular, and renal side effects.[19,20] These side effects can trouble the patients and limit the drug usage.[21] Selective COX-2 inhibitors, another type of NSAID, such as celecoxib, are used to overcome the gastrointestinal side effects associated with non-selective NSAIDs.[19]

Additionally, NSAIDs may impede tooth movement by interfering with collagenase activity and procollagen synthesis, resulting in impeded bone remodelling in the periodontal tissue.[22] Paracetamol, which mainly acts centrally on the brain rather than locally or peripherally, can relieve pain without causing these side effects.[19,23] Non-pharmacological approach includes the use of chewing gum or bite wafers, telephone follow-up, behavioural approach, low-level laser therapy (LLLT), vibration, and acupuncture.[14,24–43] Each approach has its indications and contraindications, along with its advantages and disadvantages.

According to data from the Indonesian Dental Association (PDGI), as of December 2023, the majority of Indonesian dentists, specifically 34,778 dentists or 71.4% of the total 48,718 dentists, are located in Western Indonesia. This region consists of all provinces on the islands of Sumatra and Java, as well as the provinces of West and Central Kalimantan. Notably, the utilization of oral health services is highest in this region and methods used by dentists in the region for managing orthodontic pain after fixed and removable appliances activation is still unknown. Thus, authors are interested to ascertain the most preferred method for managing orthodontic pain following fixed and removable appliances activation by dentists in Western Indonesia.

Materials and methods

A qualitative-descriptive cross-sectional study was conducted online, from August 2023 to September 2023. The study has obtained ethical clearance from the Research Ethics Committee of Universitas Padjadjaran and research permit from the Executive Board of the Indonesian Dental Association (PB-PDGI). The target population was general dentists and dental specialists in Western Indonesia. Purposive sampling technique was used, in which sample was selected according to the inclusion and exclusion criteria, and calculated by Slovin's formula, at least 100 dentists were required. The inclusion criteria were: (1) general dentist or dental specialist practicing in Western Indonesia, (2) could be contacted through social media platforms, such as WhatsApp, Instagram, or Facebook, and (3) had prior experience in treating orthodontic cases using fixed and/or removable appliances. Exclusion criteria were (1) did not complete the questionnaire. Out of 160 respondents participated by completing the questionnaire, 146 respondents met the established criteria, comprised of 54 general dentists, 4 pedodontists, 1 forensic odontologist, 84 orthodontists, 1 periodontist, and 2 oral and maxillofacial radiologists. Fourteen respondents were excluded from the study as they lacked experience in treating orthodontic cases.

The study was conducted using a cross-culturally adapted questionnaire from a study in Iraq. The adaptation was carried out through four steps: (1) forward and backward translation by two linguists, (2) synthesis of translation results into a single agreed-upon version by two orthodontists, (3) content validity test using content validity index (CVI) by two orthodontists, in which the I-CVI achieved = 1.00 so the questionnaire was considered valid, then (4) reliability test using the Pearson correlation coefficient and test-retest method on 30 non-sample subjects, in which the p-value achieved < 0.001 and Pearson correlation achieved = 0.985 so the questionnaire was considered reliable.

The questionnaire consisted of four sections: (1) dentists' preferred approach for managing orthodontic pain, comprising 1 question; (2) non-pharmacological approach, comprising 1 question; (3) pharmacological approach, comprising 8 questions; and (4) both approaches or combination of non-pharmacological and pharmacological approaches, comprising 9 questions. Each question was associated to its respective section

and was close-ended with multiple answer options. However, a few questions were followed by an open-ended question to capture information not seized by the close-ended question.

Google Forms link of the questionnaire was distributed to general dentists and dental specialists in Western Indonesia through social media platforms WhatsApp, Instagram, or Facebook. Data obtained from the Google Forms were transferred to Microsoft Excel, converted into percentages and then presented in frequency distribution tables.

Results

This study population, which was dentists practicing in Western Indonesia, as per the PDGI data of December 2023, amounted to a total of 34,778 dentists. Out of the population, 160 dentists participated by completing the questionnaire and subsequently, 146 dentists met the established inclusion and exclusion criteria, representing 0.4% of the total number of dentists in Western Indonesia.

Competency	N	%
General dentist	64	40
Oral and maxillofacial radiologist	2	1
Oral and maxillofacial pathologist	0	0
Periodontist	1	1
Oral and maxillofacial surgeon	1	1
Forensic odontologist	1	1
Prostodontist	2	1
Orthodontist	84	53
Oral medicine specialist	0	0
Pedodontist	4	3
Endodontist	1	1
Total	**160**	**100**

Table 1. Distribution of respondents by competencies.

Table 1 shows the distribution of respondents by their competencies. Most of the respondents were orthodontists, which was as many as 84 individuals or 53% of the total number of respondents, followed by general dentists which totalled 64 people (40%).

Characteristics		General Dentist		Dental specialist		Total	
		N	%	N	%	N	%
Age	24-28 years	17	27	2	2	19	12
	29-33 years	26	41	22	23	48	30
	34-38 years	12	19	17	18	29	18
	39-43 years	5	8	17	18	22	14
	44-48 years	1	2	3	3	4	3
	49-53 years	1	2	9	9	10	6
	54-58 years	1	2	18	19	19	12
	59-63 years	1	2	4	4	5	3
	64-68 years	0	0	3	3	3	2
	≥69 years	0	0	1	1	1	1
	Total	**64**	**100**	**96**	**100**	**160**	**100**
Sex	Male	10	16	28	29	38	24
	Female	54	84	68	71	122	76
	Total	**64**	**100**	**96**	**100**	**160**	**100**
Practice location	Nanggroe Aceh Darussalam	2	3	1	1	3	2
	Sumatera Utara	1	2	8	8	9	6
	Sumatera Selatan	2	3	2	2	4	3
	Sumatera Barat	1	2	1	1	2	1
	Bengkulu	1	2	0	0	1	1
	Riau	1	2	2	2	3	2
	Kepulauan Riau	1	2	0	0	1	1
	Jambi	9	14	0	0	9	6
	Lampung	0	0	0	0	0	0
	Bangka Belitung	0	0	2	2	2	1
	Kalimantan Barat	0	0	0	0	0	0
	Kalimantan Tengah	0	0	0	0	0	0
	Banten	4	6	2	2	6	4
	DKI Jakarta	10	16	14	15	24	15
	Jawa Barat	25	39	52	54	77	48
	Jawa Tengah	1	2	4	4	5	3
	Daerah Istimewa Yogyakarta	2	3	0	0	2	1
	Jawa Timur	4	6	8	8	12	8
	Total	**64**	**100**	**96**	**100**	**160**	**100**
Practice experience	≤5 years	37	58	15	16	52	33
	6-10 years	16	25	23	24	39	24
	11-15 years	5	8	23	24	28	18
	16-20 years	2	3	13	14	15	9
	21-25 years	2	3	10	10	12	8
	26-30 years	1	2	8	8	9	6
	31-35 years	1	2	3	3	4	3
	36-40 years	0	0	1	1	1	1
	Total	**64**	**100**	**96**	**100**	**160**	**100**
Experience in treating orthodontic cases	Have treated orthodontic cases	54	84	92	96	146	91
	Never treated orthodontic cases	10	16	4	4	14	9
	Total	**64**	**100**	**96**	**100**	**160**	**100**
Orthodontic appliances used	Removable	19	35	1	1	20	14
	Fixed	7	13	10	11	17	12
	Other appliances	0	0	0	0	0	0
	More than one type of appliance	28	52	81	88	109	75
	Total	**54**	**100**	**92**	**100**	**146**	**100**

Table 2. Distribution of respondents by characteristics and competencies.

Table 2 shows the distribution of respondents by their characteristics and competencies. In terms of age, most of the respondents, which was as many as 48 individuals (30%), were between 29-33 years old. Regarding sex, the majority of respondents were female, comprised of 122 individuals (76%), exceeded the number of male respondents, which was 38 individuals (24%). Nearly half of all respondents, specifically 77 individuals (48%), practiced in West Java province.

In regard to practice experience, most of the respondents, which totalled 52 individuals (33%), have practised for ≤ 5 years, followed by 39 individuals (24%) who reported have practised for 6-10 years. Notably, a total of 146 respondents (91%) had prior experience in treating orthodontic cases, with the majority of

them, specifically 109 respondents (75%) out of the 146 respondents, used more than one type of orthodontic appliances. The appliances were both removable and fixed, fixed and other appliances, or all three types.

Approach used	General Dentist		Dental specialist		Total	
	N	%	N	%	N	%
Non-pharmacological	24	44	24	26	48	33
Pharmacological	9	17	11	12	20	14
Both approaches	21	39	57	62	78	53
Total	**54**	**100**	**92**	**100**	**146**	**100**

Table 3. Distribution of respondents by approaches used for managing orthodontic pain and competencies.

Table 3 shows the distribution of respondents by the approaches they used for managing orthodontic pain and their competencies. The majority of respondents who have treated orthodontic cases, which was 78 individuals (53%), used both approaches or the combination of non-pharmacological and pharmacological approaches for managing orthodontic pain, followed by 48 respondents (33%) who used only non-pharmacological approach.

Non-pharmacological approach method	General Dentist		Dental specialist		Total	
	N	%	N	%	N	%
Chewing gum	1	4	0	0	1	2
Bite wafer	0	0	0	0	0	0
Vibration	0	0	0	0	0	0
Systemic acupuncture	0	0	0	0	0	0
Psychological perspective and behavioural management	5	21	4	17	9	19
Low-level laser therapy	0	0	0	0	0	0
Telephone follow-up	2	8	10	42	12	25
More than one method	16	67	10	42	26	54
Total	**24**	**100**	**24**	**100**	**48**	**100**

Table 4. Distribution of respondents by non-pharmacological approach methods used for managing orthodontic pain and competencies.

Table 4 shows the distribution of respondents by the non-pharmacological approach methods they used for managing orthodontic pain and their competencies. The majority of respondents who preferred non-pharmacological approach, specifically 26 individuals (54%), used more than one method for managing orthodontic pain, mainly psychological perspective, behavioural management, and telephone follow-up methods. As many as 12 respondents (25%) used only telephone follow-up method and 9 respondents (19%) used only psychological perspective and behavioural management methods.

Pharmacological approach		General Dentist		Dental specialist		Total	
		N	%	N	%	N	%
Drug names	Mefenamic acid (Ponstan, Solasic, Mefinal, Novastan)	1	11	0	0	1	5
	Paracetamol (Panadol, Sanmol, Sumagesic, Naprex)	1	11	7	64	8	40
	Diclofenac sodium (Voltaren, Flamar, Voltadex, Samcofenac)	0	0	0	0	0	0
	Diclofenac potassium (Cataflam, Eflagen, Kaflam, Aclonac)	1	11	0	0	1	5
	Ibuprofen (Farsifen, Aknil, Iremax, Proris)	0	0	0	0	0	0
	Metamizole (Antalgin, Novalgin, Norages, Santagesik)	0	0	0	0	0	0
	Other drugs	0	0	0	0	0	0
	More than one drug	6	67	4	36	10	50
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Drug dosage	Once a day	0	0	0	0	0	0
	Twice a day	1	11	1	9	2	10
	Three times a day	2	22	0	0	2	10
	As needed but not exceeding the maximum daily dose	6	67	10	91	16	80
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Drug dosage forms	Tablet	9	100	9	82	18	90
	Caplet	0	0	1	9	1	5
	Syrup	0	0	0	0	0	0
	Other forms	0	0	0	0	0	0
	More than one form	0	0	1	9	1	5
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Ask about history of hypersensitivity to prescribed drugs	Yes	8	89	11	100	19	95
	No	1	11	0	0	1	5
	Sometimes	0	0	0	0	0	0
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Ask about consumption of other drugs that may interact with prescribed drugs	Yes	8	89	4	36	12	60
	No	0	0	5	45	5	25
	Sometimes	1	11	2	18	3	15
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Cases in which drug prescribed	After separator placement	0	0	0	0	0	0
	After initial bracket and archwire placement	5	56	6	55	11	55
	After activation using power chain/closed coil or closing loop or using inter-maxillary elastic	0	0	0	0	0	0
	Each archwire change to a larger size	0	0	0	0	0	0
	More than one case	4	44	5	45	9	45
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Duration of drug consumption	One day	0	0	3	27	3	15
	Two days	0	0	1	9	1	5
	Three days	0	0	0	0	0	0
	One week	0	0	0	0	0	0
	Until the pain subsided	9	100	7	64	16	80
	Total	**9**	**100**	**11**	**100**	**20**	**100**
Best approach for pregnant patients	Consult an obstetrician	5	56	2	18	7	35
	Do not prescribe any drug	0	0	1	9	1	5
	Non-pharmacological approach	0	0	4	36	4	20
	Prescribe paracetamol	4	44	4	36	8	40
	Prescribe other drugs	0	0	0	0	0	0
	Total	**9**	**100**	**11**	**100**	**20**	**100**

Table 5. Distribution of respondents by pharmacological approach methods used for managing orthodontic pain and competencies.

Table 5 shows the distribution of respondents by the pharmacological approach methods they used for managing orthodontic pain and their competencies. Half of all respondents who preferred pharmacological approach, specifically 10 people (50%), prescribed more than one drug for managing orthodontic pain, with mefenamic acid and paracetamol being the most prescribed drugs. Additionally, 8 respondents (40%) prescribed only paracetamol. The majority of respondents, which was 16 individuals (80%), prescribed drugs for as needed, without exceeding the maximum daily dose. Nearly all respondents, which totalled 18 individuals (90%), prescribed drugs in tablet form.

Most of the respondents, specifically 19 people (95%), asked about patient's history of hypersensitivity to prescribed drugs. The majority

of respondents, which was 12 individuals (60%), asked about patient's consumption of other drugs that may interact with prescribed drugs, whereas 5 respondents (25%) did not asked such matter. Regarding orthodontic cases in which drug were prescribed, 11 respondents (55%) prescribed drugs after the initial bracket and archwire placement and the other 9 respondents (45%) prescribed drugs in more than one case, mostly after the initial bracket and archwire placement and after activation using power chain/closed coil or closing loop or using inter-maxillary elastic.

The majority of respondents, which totalled 16 individuals (80%), prescribed drugs for until the pain subsided. The best, most used approach for managing orthodontic pain in pregnant patients was prescribing paracetamol, by 8 individuals (40%), and referring patients to obstetricians, by 7 respondents (35%).

Table 6 shows the distribution of respondents by the non-pharmacological and pharmacological approaches methods they used for managing orthodontic pain and their competencies. The majority of respondents who preferred non-pharmacological and pharmacological approaches, which was as many as 49 individuals (63%), used more than one non-pharmacological approaches method for managing orthodontic pain. The most used methods were psychological perspective, behavioural management, and telephone follow-up. Another 21 respondents (27%) used only telephone follow-up method.

A total of 38 respondents (49%) prescribed more than one drug, mostly mefenamic acid and paracetamol, whereas 34 respondents (44%) prescribed only paracetamol. Most of the respondents, specifically 66 individuals (85%), prescribed drugs for as needed, without exceeding the maximum daily dose. In regards of drug dosage forms, most respondents, which totalled 56 individuals (72%), prescribed drugs in tablet form.

Nearly all respondents, which was 74 (95%), asked about patient's history of hypersensitivity to prescribed drugs. Most of the respondents, specifically 64 respondents (82%), asked about patient's consumption of other drugs that may interact with prescribed drugs. The majority of respondents, which totalled 31 people (40%), prescribed drugs after the initial bracket and archwire placement, followed by 24 respondents (31%) who prescribed drugs in more than one case, mostly in all four cases.

As many as 36 individuals (46%), nearly half of all respondents, prescribed drugs for until the pain subsided. Following this, 18 respondents (23%) prescribed drugs for one day. Regarding best approach for managing orthodontic pain in pregnant patients, 34 respondents (44%) used non-pharmacological approach, while the other 19 respondents (24%) referred patients to obstetricians.

	Kedua pendekatan	General Dentist		Dental specialist		Total	
		N	%	N	%	N	%
Non-pharmacological approach method	Chewing gum	1	5	1	2	2	3
	Bite wafer	0	0	0	0	0	0
	Vibration	0	0	0	0	0	0
	Systemic acupuncture	0	0	0	0	0	0
	Psychological perspective and behavioural management	0	0	6	11	6	8
	Low-level laser therapy	0	0	0	0	0	0
	Telephone follow-up	5	24	16	28	21	27
	More than one method	15	71	34	60	49	63
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Drug names	Mefenamic acid (Ponstan, Solasic, Mefinal, Novastan)	2	10	3	5	5	6
	Paracetamol (Panadol, Sanmol, Sumagesic, Naprex)	7	33	27	47	34	44
	Diclofenac sodium (Voltaren, Flamar, Voltadex, Samcofenac)	0	0	0	0	0	0
	Diclofenac potassium (Cataflam, Eflagen, Kaflam, Aclonac)	1	5	0	0	1	1
	Ibuprofen (Farsifen, Aknil, Iremax, Proris)	0	0	0	0	0	0
	Metamizole (Antalgin, Novalgin, Norages, Santagesik)	0	0	0	0	0	0
	Other drugs	0	0	0	0	0	0
	More than one drug	11	52	27	47	38	49
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Drug dosage	Once a day	0	0	3	5	3	4
	Twice a day	2	10	2	4	4	5
	Three times a day	4	19	1	2	5	6
	As needed but not exceeding the maximum daily dose	15	71	51	89	66	85
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Drug dosage forms	Tablet	19	90	37	65	56	72
	Caplet	1	5	6	11	7	9
	Syrup	0	0	0	0	0	0
	Other forms	0	0	0	0	0	0
	More than one form	1	5	14	25	15	19
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Ask about history of hypersensitivity to prescribed drugs	Yes	20	95	54	95	74	95
	No	1	5	0	0	1	1
	Sometimes	0	0	3	5	3	4
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Ask about consumption of other drugs that may interact with prescribed drugs	Yes	18	86	46	81	64	82
	No	2	10	4	7	6	8
	Sometimes	1	5	7	12	8	10
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Cases in which drug prescribed	After separator placement	3	14	10	18	13	17
	After initial bracket and archwire placement	8	38	23	40	31	40
	After activation using power chain/closed coil or closing loop or using inter-maxillary elastic	5	24	3	5	8	10
	Each archwire change to a larger size	1	5	1	2	2	3
	More than one case	4	19	20	35	24	31
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Duration of drug consumption	One day	2	10	16	28	18	23
	Two days	2	10	8	14	10	13
	Three days	3	14	10	18	13	17
	One week	1	5	0	0	1	1
	Until the pain subsided	13	62	23	40	36	46
	Total	**21**	**100**	**57**	**100**	**78**	**100**
Best approach for pregnant patients	Consult an obstetrician	8	38	11	19	19	24
	Do not prescribe any drug	1	5	6	11	7	9
	Non-pharmacological approach	6	29	28	49	34	44
	Prescribe paracetamol	6	29	11	19	17	22
	Prescribe other drugs	0	0	1	2	1	1
	Total	**21**	**100**	**57**	**100**	**78**	**100**

Tabel 6. Distribution of respondents by non-pharmacological and pharmacological approaches methods used for managing orthodontic pain and competencies.

Discussion

The majority of respondents were orthodontists (53%), followed by general dentists

(40%). According to data from the PDGI, as of December 2023, dentists in Western Indonesia with the highest number were general dentists, which was 30,219 individuals; endodontists, 1,194 individuals; and orthodontists, 923 individuals. Regarding age, most respondents (30%) were 29-33 years old. The distribution of dentists in Western Indonesia by age is still unknown and these results may be influenced by the purposive sampling technique, in which the entire population can be a sample if they meet the inclusion and exclusion criteria.[44,45] The inclusion and exclusion criteria in this study did not include age-related considerations.

Most of the respondents (76%) were female, exceeded the number of male respondents (24%). While the distribution of dentists in Western Indonesia by sex is unknown, it is well-known that the proportion of female dentists in Indonesia as a whole is greater than that of male dentists.[46] As for practice location, most respondents (48%) practised in West Java province. The distribution of dentists in Western Indonesia by practice location is also unknown, but the majority of them are known to be located in the Java-Bali region.[47]

As much as 33% of the respondents have practised for ≤ 5 years, followed by 24% who have practised for 6-10 years. The distribution of dentists in Western Indonesia by practice experience is unknown and these results may be influenced by the purposive sampling technique, as the inclusion and exclusion criteria used for selecting sample did not include age-related considerations.[44]

Nearly all respondents (91%) had experience in treating orthodontic cases. It is worth noting that general dentists are cleared to treat orthodontic cases only of simple class I malocclusion or dental type in both pediatric and adult patients.[48] Orthodontists, on the other hand, are cleared to treat orthodontic cases of dental and skeletal class I malocclusion, dental and skeletal class II divisions 1 and 2, class III; malocclusion with low labial frenulum attachment, with supernumerary posterior teeth, with ankylosed teeth, and due to bad habits. Moreover, orthodontists are also cleared to treat cases of malocclusion in children, adolescents, and adults accompanied by periodontal, prosthodontic, and endodontic cases; malocclusion of the anterior, posterior teeth with windowing technique; malocclusion associated with temporo mandibular joint problems; and malocclusion associated with unilateral/bilateral cleft lip and palate in newborns, children, adolescents, and adults.[49]

The majority of respondents who had experience in treating orthodontic cases (79%) used more than one type of appliance in the treatment. General dentists are cleared to treat orthodontic cases using only removable appliances.[50] Orthodontists, on the contrary, are cleared to treat orthodontic cases using removable, fixed, retention (Hawley retainer, clear retainer, fixed retainer), removable functional (activator, bionator, twin block, Frankel 2, Frankel 3), fixed functional (bite jumper, Forsus, Herbst, bite fixer), and extraoral (head gear, chin cup, face mask/reverse head gear) appliances.[49]

Most of the respondents (54%) used both approaches, which were non-pharmacological and pharmacological methods, for managing orthodontic pain. Pharmacological approach with analgesics, namely NSAIDs, are known to be the gold standard for managing orthodontic pain.[36,51–53] NSAIDs are relatively easy to get and administer, also economical.[54] However, their use can cause side effects, such as inhibition of tooth movement, increased risk of root resorption and risk of gastrointestinal, cardiovascular and renal problems.[20,29] Patients also may have allergies or conditions that are contraindicated to NSAIDs, or simply just refuse to take them.[12,55] This prompts the use of non-pharmacological approach as an alternative, which is also effective, non-invasive, economical and convenient with minimum side effects and complications.[32,52,56]

The combination of non-pharmacological and pharmacological approaches is recommended for managing pain as it helps minimize drug consumption and associated side effects while offering additional benefits to the patients, such as improved physical well-being and reduced levels of stress or anxiety.[57,58] Analgesics are effective when pain is increasing and peaking as pain at those times are almost inevitable and usually severe. As pain intensity decreases, non-pharmacological approach is used to manage pain while minimising drug consumption and possible side effects.[59]

As much as 52% of the respondents who preferred non-pharmacological approach and 63% who preferred both approaches used more

than one non-pharmacological approach method for managing orthodontic pain, mostly psychological perspectives, behavioral management, and telephone follow-up. Although their effectiveness to alleviate orthodontic pain is still controversial, a combination of several non-pharmacological methods is known to be more effective in reducing pain.[60] Psychological factors play an important role in the pain process, where pain threshold, intensity, and tolerance are influenced by cognition, personality, and past experience.[42] Distraction, visualisation, relaxation, and suggestion in psychological interventions can alter the patient's awareness of pain. These techniques can act as a pain buffer or as an adaptive coping strategy, which is an attempt to deal with problems, in this case pain, in a positive way.[37,39–41,43,61–67] Psychological interventions are relatively cost-effective and easy to implement. However, they are not without drawbacks, such as the possibility for muscle soreness from physical activities, unwanted emotions or thoughts emerging during music therapy, and the necessity for patients commitment and excellent dentists' competence in cognitive-behavioral therapy (CBT).[37,41,68–72]

Telephone calls from healthcare providers during orthodontic treatment can alleviate anxiety and, as a result, reduce patients' perception of pain.[12,14,25,29,40,67,73–75] Telephone follow-up can save patients' and dentists' time, money, and resources, but the lack of information from non-verbal communication can affect the effectiveness of pain management.[76,77] Other methods, such as chewing gum and bite wafers, are also effective at reducing pain and relatively easy to use, but chewing gum risks damaging the appliances and bite wafers can be difficult to position, also due to their standardised thickness and consistency and variations in patient tooth position, the resulting bite force can be uneven.[36,52,78–80] LLLT and vibration can improve tooth movement and shorten the duration of orthodontic treatment, but LLLT is time-consuming and vibration requires special equipments.[41,81–84] Acupuncture is also time-consuming and risks causing bleeding or bruising in patients with bleeding disorders and those taking anticoagulant drugs.[85,86]

In regards to drug prescribed, half of all respondents who preferred pharmacological approach (50%) and nearly half of all respondents who preferred both approaches (49%) prescribed more than one drug for managing orthodontic pain, mostly mefenamic acid and paracetamol. The pain experienced by each individual can vary and is influenced by various factors, including psychological, environmental, psychosocial, and emotional factors.[87] Drugs are selected by considering the patient's response, any allergies the patient has, and the interaction of the prescribed drugs with other drugs the patient is taking, so that pain management is effective and does not harm the patient.[22] NSAID drugs, including mefenamic acid and paracetamol, have equivalent analgesic effects, but paracetamol's weak anti-inflammatory effect makes the consequences of overdosing on it higher.[19,88–94]

The majority of respondents who preferred pharmacological approach (80%) and who preferred both approaches (85%) prescribed drugs for as needed, without exceeding the maximum daily dose. Pain tolerance threshold, which is the maximum level of pain an individual can endure, varies among individuals and influences their need for pain relief.[95,96] Instruction to take analgesics as needed and not exceeding the maximum daily dose may prevent drug overuse, given that they are used only to relieve pain symptom caused by orthodontic treatment.[97]

Nearly all respondents who preferred pharmacological approach (90%) and the majority of respondents who preferred both approaches (72%) prescribed drugs in tablet form. Tablets are the most frequently prescribed dosage form by doctors.[98] Tablet dosage form is considered superior to other forms due to their practical use, precise dosage, and stable storage.[99,100]

Most of the respondents who preferred pharmacological approach (95%) and who preferred both approaches (95%) asked about patient's consumption of other drugs that may interact with prescribed drugs. Furthermore, the majority of respondents who preferred pharmacological approach (60%) and who preferred both approaches (82%) asked about patient's consumption of other drugs that may interact with prescribed drugs. As per the Indonesian Ministry of Health Decree Number HK.01.07/MENKES/1423/2022, which outlines the Guidelines for Variables and Meta Data in the Implementation of Electronic Medical Records, it is stipulated that medical records must include

the documentation of allergy history, including to drugs, and medication history as essential variables.[101] Information on drug allergy and medication history that is unclear, incomplete, or inaccurate can harm the patient as it can lead to medication errors and the treating doctor may be held liable.[102,103]

The majority of respondents who preferred pharmacological approach (55%) and who preferred both approaches (40%) prescribed drugs after the initial bracket and archwire placement. Orthodontic pain can be felt by patients during almost all treatment procedures, including separator placement, initial archwire placement, band placement, elastic placement, rapid maxillary expansion, and debonding.[38] Different orthodontic treatment procedures produce different degrees of pain.[104] The pain produced by alignment and levelling procedures using archwire is known to be greater than that produced by separator placement procedure, increasing the need for pain relief, including with analgesics.[105]

Regarding duration of drug consumption, most of the respondents who preferred pharmacological approach (80%) and nearly half of all respondents who preferred both approaches (46%) prescribed drugs for until the pain subsided. The intensity and duration of orthodontic pain varies between patients, as does their need for pain relief.[96,106] Analgesics are used only to relieve pain so when the pain is no longer troubling the patient, their use must be discontinued.[107]

As for best approach for managing pain in pregnant patients, most of the respondents who preferred pharmacological approach (40%) prescribed paracetamol. Conversely, most of the respondents who preferred both approaches (44%) used non-pharmacological approach for managing pain in pregnant patients. It is noteworthy that globally, more than 50% of pregnant women use paracetamol to manage pain and fever. Paracetamol is considered safe to use by pregnant women as long as it is in accordance with the instructions for use. However, some studies suggest that consumption of paracetamol in prenatal period may alter foetal development, increasing the risk of certain neurodevelopmental, reproductive and urogenital disorders.[108] Non-pharmacological approach is considered safer and more convenient than pharmacological approach as they have fewer and less complex side effects, and can overcome the negative effects of drug use.[109]

This study limitations include a relatively small sample size and the absence of representation from three provinces, specifically Lampung, West Kalimantan, and Central Kalimantan. Challenges faced by authors in addressing these limitations are the lack of dentists' engagement in responding to the questionnaire distributed through social media platforms and limited time available for conducting the study. Future research is recommended to be conducted over a longer period of time and involve dentists in each relevant province so that the results of the study can portray the situation in Western Indonesia entirely. Among the methods most used by dentists in the management of orthodontic pain after fixed and removable appliances activation in this study, the best method is not yet known. Therefore, further research should be conducted on the best method for managing orthodontic pain following fixed and removable appliances activation.

Conclusions

The most preferred method for managing orthodontic pain following fixed and removable appliances activation by dentists in Western Indonesia was combination of non-pharmacological and pharmacological methods. Psychological perspective, behavioural management, and telephone follow-up were the most preferred non-pharmacological method, whereas prescribing mefenamic acid and paracetamol was the most preferred pharmacological method.

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Declaration of Interest

The authors report no conflict of interest.

References

1. Eslamian L, Torshabi M, Motamedian SR, Hemmati YB, Mortazavi SA. The effect of naproxen patches on relieving orthodontic pain by evaluation of VAS and IL-1β inflammatory factor: a split-mouth study. Dental Press J Orthod. 2019;24(6):27.e1-27.e7. doi:10.1590/2177-6709.24.6.27.e1-7.onl
2. Shi Q, Yang S, Jia F, Xu J. Does low level laser therapy relieve the pain caused by the placement of the orthodontic separators? ——a meta-analysis. Head Face Med. 2015;11:28. doi:10.1186/s13005-015-0085-6
3. Cardoso PC, Espinosa DG, Mecenas P, Flores-Mir C, Normando D. Pain level between clear aligners and fixed appliances: a systematic review. Prog Orthod. 2020;21:3. doi:10.1186/s40510-019-0303-z
4. Abtahi SM, Mousavi SA, Shafaee H, Tanbakuchi B. Effect of low-level laser therapy on dental pain induced by separator force in orthodontic treatment. Dent Res J (Isfahan). 2013;10(5):647-651.
5. Qamruddin I, Alam MK, Mahroof V, et al. Biostimulatory Effects of Low-Intensity Pulsed Ultrasound on Rate of Orthodontic Tooth Movement and Associated Pain, Applied at 3-Week Intervals: A Split-Mouth Study. Pain Res Manag. 2021;2021:6624723. doi:10.1155/2021/6624723
6. Torsello F, D'Amico G, Staderini E, Marigo L, Cordaro M, Castagnola R. Factors Influencing Appliance Wearing Time during Orthodontic Treatments: A Literature Review. Appl Sci. 2022;12(15):7807. doi:10.3390/app12157807
7. Chopra SS, Kamboj A. Clinical comparison of pain: Self-ligating versus conventional fixed orthodontic appliance systems. Int J Orthod Rehabil. 2021;12(3):108-114. doi:10.4103/ijor.ijor
8. da Costa EO, Blagitz MN, Normando D. Impact of catastrophizing on pain during orthodontic treatment. Dental Press J Orthod. 2020;25(1):64-69. doi:10.1590/2177-6709.25.1.064-069.oar
9. Aggarwal P, Kaur G, Jain N. Orthodontic pain: From causes to management. Eur J Mol Clin Med. 2022;9(8):2294-2307.
10. White DW, Julien KC, Jacob H, Campbell PM, Buschang PH. Discomfort associated with Invisalign and traditional brackets: A randomized, prospective trial. Angle Orthod. 2017;87(6):801-808. doi:10.2319/091416-687.1
11. Ming CJ, Tolos SM. Orthodontic pain – the state of the evidence. IIUM J Orofac Heal Sci. 2022;3(2):203-211. doi:10.31436/ijohs .v3i2.155
12. Fleming PS, Strydom H, Katsaros C, et al. Non-pharmacological interventions for alleviating pain during orthodontic treatment. Cochrane Database Syst Rev. 2016;12:CD010263. doi:10.1002/14651858.CD010263.pub2
13. Shenoy N, Shetty S, Ahmed J, Ashok Shenoy K. The Pain Management in Orthodontics. J Clin Diagnostic Res. 2013;7(6):1258-1260. doi:10.7860/JCDR/2013/4860.3036
14. Topolski F, Moro A, Correr GM, Schimim SC. Optimal management of orthodontic pain. J Pain Res. 2018;11:589-598. doi:10.2147/JPR.S127945
15. Cheng C, Xie T, Wang J. The efficacy of analgesics in controlling orthodontic pain: a systematic review and meta-analysis. BMC Oral Health. 2020;20(1):1-9. doi:10.1186/s12903-020-01245-w
16. Swami V, Swami V. Effect of Nonsteriodal Anti-Inflammatory Drugs on Orthodontic Tooth Movement – Review. IOSR J Pharm. 2015;5(6):23-29.
17. Olteanu CD, Bucur S-M, Chibelean M, Bud ES, Păcurar M, Feștilă DG. Pain Perception during Orthodontic Treatment with Fixed Appliances. Appl Sci. 2022;12:6389. doi:10.3390/app12136389
18. Wajekar NA, Sastri MR, Vazirani NN, Pathak SS. Comparison between Acetaminophen, Ibuprofen, and Ketorolac as an Efficient Single-Dose Preoperative Medication for Control of Pain Associated with Initial Aligning Archwire: A Double-Blind Randomized Control Trial. J Indian Orthod Soc. 2019;53(1):3-9. doi:10.4103/jios.jios_12_18
19. Corrêa AS, De Almeida VL, Lopes BMV, et al. The influence of non-steroidal anti-inflammatory drugs and paracetamol used for pain control of orthodontic tooth movement: a systematic review. An Acad Bras Cienc. 2017;89(4):2851-2863. doi:10.1590/0001-3765201720160865
20. Stiller C-O, Hjemdahl P. Lessons from 20 years with COX-2 inhibitors: Importance of dose–response considerations and fair play in comparative trials. J Intern Med. 2022;292(4):557-574. doi:10.1111/joim.13505
21. Zhu XT, Chen L, Lin J-H. Selective COX-2 inhibitor versus non-selective COX-2 inhibitor for the prevention of heterotopic ossification after total hip arthroplasty: A meta-analysis. Medicine (Baltimore). 2018;97(31):e11649. doi:10.1097/MD.0000000000011649
22. Nahidh M, Alsaadi MML. Controlling Orthodontic Pain from Orthodontists Perspectives-A Survey. J Res Med Dent Sci. 2021;9(12):124-133.
23. Mofti B, ElShehaby M, Montasser MA, Bearn D. Pharmacological Management of Orthodontic Pain: A Systematic Review and Meta-Analysis. Acta Sci Dent Sci. 2020;4(9):125-135.
24. Boleta-Ceranto D de CF, de Souza RS, Silverio-Lopes S, Moura NC. Orthodontic post-adjustment pain control with acupuncture. Dental Press J Orthod. 2014;19(4):100-106. doi:10.1590/2176-9451.19.4.100-106.oar
25. Cozzani M, Ragazzini G, Delucchi A, et al. Self-reported pain after orthodontic treatments: a randomized controlled study on the effects of two follow-up procedures. Eur J Orthod. 2016;38(3):266-271. doi:10.1093/ejo/cjv032
26. Farias RD, Closs LQ, Miguens SAQJ. Evaluation of the use of low-level laser therapy in pain control in orthodontic patients: A randomized split-mouth clinical trial. Angle Orthod. 2016;86(2):193-198. doi:10.2319/122214-933.1
27. Kochar GD, Londhe SM, Varghese B, Jayan B, Kohli S, Kohli VS. Effect of Low-level Laser Therapy on Orthodontic Tooth Movement. J Indian Orthod Soc. 2017;51(2):81-86. doi:10.4103/jios.jios_200_16
28. Lobre WD, Callegari BJ, Gardner G, Marsh CM, Bush AC, Dunn WJ. Pain control in orthodontics using a micropulse vibration device: A randomized clinical trial. Angle Orthod. 2016;86(4):625-630. doi:10.2319/072115-492.1
29. Hussain AS, Al Toubity MJ, Elias WY. Methodologies in Orthodontic Pain Management: A Review. Open Dent J. 2017;11:492-497. doi:10.2174/1874210601711010492
30. Al Shayea EI. Comparative Assessment between Ibuprofen, Chewing Gum, and Bite Wafers in Pain Control Following First Arch Wire Placement in Orthodontic Patients. J Contemp Dent Pract. 2020;21(4):416-420. doi:10.5005/jp-journals-10024-2804
31. Delavarian M, Imani MM, Delavarian F, Bayani S. Comparison of chewing gum and ibuprofen in alleviating orthodontic pain: a single centre, randomised clinical trial. Australas Orthod J. 2020;36(1):38-44. doi:10.21307/aoj-2020-005
32. Santos DJ da S, Jr. C. Chewing gum as a non-pharmacological alternative for orthodontic pain relief: A randomized clinical trial using an intention-to-treat analysis. Korean J Orthod. 2021;51(5):346-354. doi:10.4041/kjod.2021.51.5.346
33. Abdul-Aziz AI. Effect of Chewing Gum on Pain Following Orthodontic Elastomeric Separators Placement: A Randomized Controlled Trial. Open Access Maced J Med Sci. 2021;9(D):143-148. doi:10.3889/oamjms.2021.6782
34. Deshpande P, Patil K, Mahima VG, Shivalinga BM, Suchetha M, Ranjan A. Low-level laser therapy for alleviation of pain from fixed orthodontic appliance therapy: A randomized controlled trial. J Adv Clin Res Insights. 2016;3(2):43-46. doi:10.15713/ins.jcri.103
35. Bakdach W, Hadad R. Effects of toothbrush-generated vibration and ultrasound on pain perception following orthodontic elastomeric separation: a randomized controlled clinical trial. J Stomatol. 2022;75(2):80-86. doi:10.5114/jos.2022.117335
36. Shetty M, Sangamesh B, Shetty A, Patil A. Evaluation of the efficacy of bite wafer chewing in pain reduction in fixed orthodontic appliance treatment. Gulhane Med J. 2020;62(1):28-32. doi:10.4274/gulhane.galenos.2019.783
37. Fatima Z, Shaheen A, Ahsan W, Illyas M. Effect of physical activity level on orthodontic pain perception after separator placement in adult patients managed at a tertiary care teaching

public sector hospital in Lahore. J Fatima Jinnah Med Univ. 2022;16(3):134-137. doi:10.37018/CIAI8143
38. Long H, Wang Y, Jian F, Liao L-N, Yang X, Lai W-L. Current advances in orthodontic pain. Int J Oral Sci. 2016;8:67-75. doi:10.1038/ijos.2016.24
39. Sandhu SS, Sandhu J. Effect of physical activity level on orthodontic pain perception and analgesic consumption in adolescents. Am J Orthod Dentofac Orthop. 2015;148(4):618-627. doi:10.1016/j.ajodo.2015.04.037
40. Mando M, Talaat S. The Role of Attitude Modification Interventions in the Reduction of Orofacial Pain in Patients Undergoing Orthodontic Treatment: A Scoping Review. Eur J Gen Dent. 2021;10(2):96-100. doi:10.1055/s-0041-1732952
41. Sawada A, Usui N, Shimazaki K, Taira M, Ono T. The effects of cognitive behavioral therapy on experimental orthodontic pain. Orthod Waves. 2015;74(1):10-14. doi:10.1016/j.odw.2014.12.001
42. Mando M, Talaat S. Efficacy of Psychological Interventions in The Reduction of Orthodontic Pain at Its Peak of Intensity in Patients Undergoing Fixed Orthodontic Treatment: A Systematic Review and Meta-analysis. Futur Dent J. 2021;7(1):57-63. doi:10.54623/fdj.70110
43. Azeem M, Ejaz Z, Ashraf A, Bukhari F, Ali MM, Rashid A. Music for Pain Control Following Orthodontic Initial Archwire Placement. Pakistan J Med Heal Sci. 2021;15(6):1347-1348. doi:10.53350/pjmhs211561347
44. Siampa FA, Samad R. Penerapan Proteksi Dokter Gigi sebagai Upaya Pencegahan terhadap Infeksi Silang: Penelitian di Kota Makassar. Makassar Dent J. 2014;3(1):1-7.
45. Sugiyono. Metode Penelitian Kuantitatif, Kualitatif, Dan R&D. Bandung: Alphabet; 2019.
46. Adyatmaka I. Persepsi Kinerja dan Tantangan yang Dihadapi Dokter Gigi dalam Praktik. SONDE (Sound Dent. 2021;6(2):8-26. doi:10.28932/sod.v6i2.3976
47. Sinaga AP, Puspandari DA, Marthias T. Korelasi Disparitas Ketersediaan Tenaga Medis Gigi Antardaerah terhadap Pemanfaatan Layanan Gigi dan Mulut di Indonesia. J Manaj Pelayanan Kesehat. 2022;25(03):108-115.
48. Konsil Kedokteran Indonesia. Peraturan Konsil Kedokteran Indonesia Nomor 40 Tahun 2015 Tentang Standar Kompetensi Dokter Gigi Indonesia. Konsil Kedokteran Indonesia; 2015.
49. IKORTI. Kewenangan Klinis Spesialis Ortodontis Indonesia. Jakarta: Kolegium Ortodonti; 2013.
50. Azkia R, Dwiatmoko S, Hadnyanawati H. Analisis Faktor yang Berhubungan dengan Pemilihan Operator Perawatan Ortodonti Cekat pada Remaja di SMAN 2 Bondowoso. e-Journal Pustaka Kesehat. 2021;9(3):172-181.
51. Alqahtani JM, Alzaid SA, Aldhaban OA, et al. An overview of analgesic methodologies in orthodontics. Int J Community Med Public Heal. 2023;10(12):4993-4997. doi:10.18203/2394-6040.ijcmph20233525
52. Basam LC, Singaraju GS, Obili S, Keerthipati T, Basam RC, Prasad M. Orthodontic pain control following arch wire placement; a comparison between pre-emptive tenoxicam and chewing gum: a randomized clinical trial. J Dent Anesth Pain Med. 2022;22(2):107-116. doi:10.17245/jdapm.2022.22.2.107
53. Bayani S, Rostami S, Ahrari F, Saeedipouya I. A randomized clinical trial comparing the efficacy of bite wafer and low level laser therapy in reducing pain following initial arch wire placement. Laser Ther. 2016;25(2):121-129. doi:10.5978/islsm.16-OR-10
54. Monk AB, Harrison JE, Worthington H V., Teague A. Pharmacological interventions for pain relief during orthodontic treatment. Cochrane Database Syst Rev. 2017;11(11):CD003976. doi:10.1002/14651858.CD003976.pub2
55. Waheed-Ul-Hamid M, Ul Haq A, Mahmood HS, Azeem M, Irfan S. Comparison between Ibuprofen and Chewing Gum for Orthodontic Pain Control. Pakistan Oral Dent J. 2016;36(1):79-83.
56. Awad WHA, Hashem ES. In-service Training Program Regarding Nurses' performance for Non- Pharmacological Pain Management Among Orthopedic Patients. Egypt J Heal Care. 2019;10(3):330-344. doi:10.21608/ejhc.2019.159677
57. Ay F. Treatment of postoperative pain and non-pharmacologic practices in nursing systematic review: Results of Turkish doctoral dissertation in 2000-2015. Agri. 2018;30(2):71-83. doi:10.5505/agri.2018.28247
58. Pickering G, Lussier D. Pharmacological Pain Management: For Better or for Worse? In: Pain, Emotion and Cognition: A Complex Nexus. Switzerland: Springer International Publishing; 2015:137-151. doi:10.1007/978-3-319-12033-1
59. Tano PF, Apiribu F, Tano EK, Agambire R, Boateng I, Sefah V. Patient satisfaction in the use of non-pharmacological therapies in the management of postoperative pain: a study in a tertiary hospital, Ghana. medRxiv. 2022. doi:https://doi.org/10.1101/2022.04.28.22274426
60. Lee FS, Minhat HS, Ahmad SA. Non-Pharmacological Treatment Uptake for Chronic Musculoskeletal Pain among Community-Dwelling Older Adults in Petaling District, Selangor. Malaysian J Med Heal Sci. 2020;16(2):219-229.
61. Aly A El, Hansa I, Ferguson DJ, Vaid NR. The effect of alpha binaural beat music on orthodontic pain after initial archwire placement: A randomized controlled trial. Dental Press J Orthod. 2022;27(6):e2221150. doi:10.1590/2177-6709.27.6.e2221150.oar
62. Wei S, Li L, Yang X, Li X, Jiang Q. Psychological interventions in the pain management after hip and knee arthroplasty: a mini review. Ann Jt. 2020;5(13). doi:10.21037/aoj.2019.12.06
63. Ramón LAS De, Martínez AFF, Carricondo ARG, Gálvez FE, Rodríguez RA. Effect of virtual reality and music therapy on anxiety and perioperative pain in surgical extraction of impacted third molars. J Am Dent Assoc. 2023;154(3):206-214.
64. Xu X, Zhang L, Jiang Y, Huang Y, Huang S, Yang S. Clinical research of music in relieving orthodontic pain. West China J Stomatol. 2013;31(4):365-368.
65. Noma N, Watanabe Y, Shimada A, et al. Effects of cognitive behavioral therapy on orofacial pain conditions. J Oral Sci. 2021;63(1):4-7. doi:10.2334/josnusd.20-0437
66. Sandhu SS, Sandhu J. Orthodontic pain: An interaction between age and sex in early and middle adolescence. Angle Orthod. 2013;83(6):966-972. doi:10.2319/030113-174.1
67. Feng C, Wu C, Jiang Z, Zhang L, Zhang X. Effectiveness of different psychological interventions in reducing fixed orthodontic pain: A systematic review and meta-analysis. Australas Orthod J. 2019;35(2):195-209. doi:10.21307/aoj-2020-049
68. Ambrose KR, Golightly YM. Physical exercise as non-pharmacological treatment of chronic pain: Why and when. Best Pract Res Clin Rheumatol. 2015;29(1):120-130. doi:10.1016/j.berh.2015.04.022.Physical
69. Afrina R, Karimah A. Cognitive Behavioral Therapy for Chronic Pain. Biomol Heal Sci J. 2019;2(2):129-134. doi:10.20473/bhsj.v2i2.14963
70. Redding J, Plaugher S, Cole J, et al. "Where's the Music?" Using Music Therapy for Pain Management. Fed Pract. 2016;33(12):46-49.
71. Geneen LJ, Moore RA, Clarke C, Martin D, Colvin LA, Smith BH. Physical activity and exercise for chronic pain in adults: an overview of Cochrane Reviews. Cochrane Database Syst Rev. 2017;4(4):CD011279. doi:10.1002/14651858.CD011279.pub3
72. Ettenberger M, Maya R, Salgado-Vasco A, et al. The Effect of Music Therapy on Perceived Pain, Mental Health, Vital Signs, and Medication Usage of Burn Patients Hospitalized in the Intensive Care Unit: A Randomized Controlled Feasibility Study Protocol. Front Psychiatry. 2021;12:714209. doi:10.3389/fpsyt.2021.714209
73.Zheng X, Zhao J, Wang Z,et al. Postoperative online follow-up improves the quality of life of patients who undergo extraction of impacted madibular third molars: a randomized controlled trial. Clin Oral Investig.2021;25(3):993-999. doi:10.1007/s00784-020-03388-0
74. Mendonça DL, Almeida-Pedrin RR, Pereira NC, Oltramari PVP, Fernandes TMF, Conti AC de CF. The influence of text messages and anxiety on pain perception and its impact on orthodontic patients routine. Dental Press J Orthod. 2020;25(5):30-37. doi:10.1590/2177-6709.25.5.030-037.oar
75. Ramalingam S, Alotaibi O, Alqudairy Z, Alnutaifi A, Alotaibi A. Effectiveness of Phone Call Follow-Ups in Improving Patient Compliance to Post-extraction Instructions: A Cross-Sectional Study. Cureus. 2022;14(11):e31499. doi:10.7759/cureus.31499
76. Halvorsen U, Bjørnnes AK, Ljosaa TM. Nurse-Led Telephone Follow-Up Intervention for Titrating and Tapering Opioids in Chronic

Pain Patients – A Feasibility Study. J Pain Res. 2023;16:1285-1300. doi:10.2147/JPR.S394878
77. Pippi R, Pietrantoni A, Patini R, Santoro M. Is telephone follow-up really effective in early diagnosis of inflammatory complications after tooth extraction? Med Oral Patol Oral y Cir Bucal. 2018;23(6):e707-e715. doi:10.4317/medoral.22465
78. Guo Q, Liao C, Guan X, et al. Effect of chewing gum on orthodontic pain in patients receiving fixed orthodontic treatment: a systematic review and meta-analysis. Eur J Med Res. 2023;28(1):491. doi:10.1186/s40001-023-01467-y
79. Al-Melh MA, Nada A, Badr H, Andersson L. Effect of an Anesthetic Chewing Gum on the Initial Pain or Discomfort from Orthodontic Elastomeric Separator Placement. J Contemp Dent Pract. 2019;20(11):1286-1292. doi:10.5005/jp-journals-10024-2708
80. Mangnall LAR, Dietrich T, Scholey JM. A randomized controlled trial to assess the pain associated with the debond of orthodontic fixed appliances. J Orthod. 2013;40(3):188-196. doi:10.1179/1465313313Y.0000000045
81. Pérignon B, Bandiaky ON, Fromont-Colson C, et al. Effect of 970 nm low-level laser therapy on orthodontic tooth movement during Class II intermaxillary elastics treatment: a RCT. Sci Rep. 2021;11:23226. doi:10.1038/s41598-021-02610-7
82. Alqahtani JM, Alzaid SA, Aldhaban OA, et al. An overview of analgesic methodologies in orthodontics. Int J Community Med Public Heal. 2023;10(12):4993-4997. doi:10.18203/2394-6040.ijcmph20233525
83. Goyal V, Singh RK, Gupta N, Singh G, Relhan A. Role of Vibrations in Orthodontics: A Review. Orthod J Nepal. 2018;8(2):50-54. doi:10.3126/ojn.v8i2.23072
84. Shipley T, Farouk K, El-Bialy T. Effect of high-frequency vibration on orthodontic tooth movement and bone density. J Orthod Sci. 2019;8:15. doi:10.4103/jos.JOS_17_19
85. Ohrbach M. Effective Uses, Risk Factors and Procedures for Acupuncture. J Pain Manag Med. 2022;8(1):1000162. doi:10.35248/2684-1320.22.8.162.Citation
86. Poojary D, Singh D, Anjum R, Dao DT, Kudva S. Acupressure–A Review with a Current and Future Prospective in Dentistry. Medico-Legal Updat. 2020;20(3):320-325. doi:10.37506/mlu.v20i3.1416
87. Diddige R, Negi G, Kiran KVS, Chitra P. Comparison of pain levels in patients treated with 3 different orthodontic appliances - a randomized trial. Med Pharm Reports. 2020;93(1):81-88. doi:10.15386/mpr-1311
88. Nayoan CR, Syamsi N. Analgesic Potency Of Ibuprofen, Paracetamol, And Mephenamic Acid: A Randomized Controlled Trial. Medica Hosp. 2023;10(2):203-208. doi:10.36408/mhjcm.v10i2.842
89. Lanas A, Benito P, Alonso J, et al. Safe Prescription Recommendations for Non Steroidal Anti-inflammatory Drugs: Consensus Document Elaborated by Nominated Experts of Three Scientific Associations (SER-SEC-AEG). Reumatol Clínica. 2014;10(2):68-84. doi:10.1016/j.reumae.2013.10.008
90. Kumar GP, Shu-Lyn C, Win GE, Sie LW, Lakman NFK binti, Haque N. Comparison between preoperative and post-operative administration of paracetamol, ibuprofen and mefenamic acid for post-extraction pain control. Biomed Res Ther. 2020;7(5):3794-3798. doi:10.15419/bmrat.v7i5.606
91. Blondell RD, Azadfard M, Wisniewski AM. Pharmacologic Therapy for Acute Pain. Am Fam Physician. 2013;87(11):766-772.
92. Nikolova I, Petkova V, Tencheva J, Benbasat N, Voinikov J, Danchev N. Metamizole: A Review Profile of a Well-Known "Forgotten" Drug. Part II: Clinical Profile. Biotechnol Biotechnol Equip. 2013;27(2):3605-3619. doi:10.5504/BBEQ.2012.0135
93. Pelletier J-P, Martel-Pelletier J, Rannou F, Cooper C. Efficacy and safety of oral NSAIDs and analgesics in the management of osteoarthritis: Evidence from real-life setting trials and surveys. Semin Arthritis Rheum. 2016;45(4):S22-S27. doi:10.1016/j.semarthrit.2015.11.009
94. Kim S-J, Seo JT. Selection of analgesics for the management of acute and postoperative dental pain: a mini-review. J Periodontal Implant Sci. 2020;50(2):68-73. doi:10.5051/jpis.2020.50.2.68
95. Cimpean A, David D. The mechanisms of pain tolerance and pain-related anxiety in acute pain. Heal Psychol Open. 2019;6(2). doi:10.1177/2055102919865161
96. Utami RN, Khoiriyah K. Penurunan Skala Nyeri Akut Post Laparatomi Menggunakan Aromaterapi Lemon. Ners Muda. 2020;1(1):23-33. doi:10.26714/nm.v1i1.5489
97. Mccarthy DM, Davis TC, King JP, et al. Take-Wait-Stop: A patient-Centered Strategy for Writing PRN Medication Instructions. J Health Commun. 2013;18(sup1):40-48. doi:10.1080/10810730.2013.825675
98. Widyastuti W. Profil Peresepan Obat pada Poli Bedah RSUD Batusangkar Tahun 2012. J Kesehat Perintis. 2015;2(2):14-18.
99. Nurjanah F, Sriwidodo S, Nurhadi B. Stabilisasi Tablet yang Mengandung Zat Aktif Bersifat Higroskopis. Maj Farmasetika. 2020;6(1):10-22. doi:10.24198/mfarmasetika.v6i1.27420
100. Suparman A, Susilawati Y, Chaerunisa AY. Formulasi Tablet dengan Bahan Aktif Ekstrak Tumbuhan Obat Indonesia: Review. Maj Farmasetika. 2021;6(3):234-252. doi:10.24198/mfarmasetika.v6i3.32259
101. Kementerian Kesehatan Republik Indonesia. Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/MENKES/1423/2022 Tentang Pedoman Variabel Dan Meta Data Pada Penyelenggaraan Rekam Medis Elektronik. Kementerian Kesehatan Republik Indonesia; 2022.
102. Harig A, Rybarczyk A, Benedetti A, Zimmerman J. Clarification of Drug Allergy Information Using a Standardized Drug Allergy Questionnaire and Interview. P T. 2018;43(8):480-504.
103. Sukarsa CS, Masturoh I. Tinjauan Kelengkapan Dokumen Rekam Medis Rawat Inap Kasus Acute Appendicitis Berdasarkan Huffman di RSUD Sumedang. Media Inf. 2023;19(1):46-54.
104. Panda S, Verma V, Sachan A, Singh K. Perception of pain due to various orthodontic procedures. Quintessence Int (Berl). 2015;46(7):603-609. doi:10.3290/j.qi.a33933
105. Bruno MB, Bruno MAD, Krymchantowski A V., da Motta AFJ, Mucha JN. A double-blind, randomized clinical trial assessing the effects of a single dose of preemptive anti-inflammatory treatment in orthodontic pain. Prog Orthod. 2011;12(1):2-7. doi:10.1016/j.pio.2011.02.002
106. Bartolucci ML, Parenti SI, Solidoro L, et al. The Effect of Different Archwires on Initial Orthodontic Pain Perception: A Prospective Controlled Cohort Study. Appl Sci. 2023;13(8):4929. doi:10.3390/app13084929
107. Western Australian Government's Department of Health. Pain Relief Medications Following Surgery and Injury. Western Australian Government's Department of Health; 2017.
108. Bauer AZ, Swan SH, Kriebel D, et al. Paracetamol use during pregnancy — a call for precautionary action. Nat Rev Endocrinol. 2021;17(12):757-766. doi:10.1038/s41574-021-00553-7
109. Kia Z, Allahbakhshian M, Ilkhani M, Nasiri M, Allahbakhshian A. Nurses' use of non-pharmacological pain management methods in intensive care units: A descriptive cross-sectional study. Complement Ther Med. 2021;58:102705. doi:10.1016/j.ctim.2021.102705