



CODEN [USA]: IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2013738>Available online at: <http://www.iajps.com>

Review Article

AN OVERVIEW OF MANAGEMENT OF ORTHODONTIC PAIN**Bedour Kanjari, Rana Rushdy Filfilan, Ali Mohammed Maroof, Nour Khalid Mohammed,
Mona Ahmad Alhakmi, Emad Akram Al Reefy****Abstract:**

Taking into consideration the importance of pain control to promote patient well-being and avoid orthodontic therapy withdrawal, this review intended to identify, via an analysis of the clinical literary works, the very best method for taking care of orthodontic pain. We performed comprehensive search using biomedical databases; Medline, and Embase, for studies concerned with management of orthodontic pain published with English language up to, October 2018. Discomfort is a subjective feedback, which shows huge individual variations. It is dependent upon factors such as age, gender, specific pain limit, the magnitude of the force applied, existing mood and stress and anxiety, cultural distinctions, and previous pain experiences. Effective orthodontist-patient interaction and targeted dietary advice may assist in avoiding discomfort and discomfort experienced by the patients somewhat. Nonetheless, based on the offered literary works, analgesics stayed the effective and regular technique of pain management. Moreover, while prescribing analgesics, orthodontists must know the pharmacological activity as well as the benefits and drawbacks associated with each medication. An optimum advised dosage must be considered for each and every patient. Patients with special conditions such as emotional discomfort or trigeminal neuralgia typically call for cooperation with their experts and advanced care management.

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Please cite this article in press Bedour Kanjari et al., *An Overview of Management of Orthodontic Pain.*, Indo Am. J. P. Sci, 2018; 05(12).

INTRODUCTION:

Ache, that includes sensations stimulated by, and reactions to, noisome stimuli, is an intricate experience and usually comes with orthodontic appointments. This, among one of the most pointed out adverse impacts of orthodontic treatment, is of major issue to patients as well as medical professionals [1]. Orthodontic tooth motion is an outcome of the application of forces to the teeth. The orthodontic forces promote tooth displacement in the periodontal ligament space, causing the formation of areas of compression and traction. These stimulations trigger a series of tissue reactions that cause bone remodeling of the alveolus via the procedures of bone resorption and apposition, thus permitting modifications in tooth positioning [1]. These procedures are alonged with a stimulation of nerve endings in the periodontal ligament and an inflammatory process, which frequently leads to pain [2]. Pain is among one of the most crucial adverse effects of orthodontic tooth movement and one of the elements that prevent patients the most from starting orthodontic treatment. On top of that, it is amongst the main reasons for therapy withdrawal [2].

Nonetheless, in spite of the relevance of ache in the medical practice of orthodontics, this sign is regularly undervalued and gets little interest. Taking into consideration the importance of pain control to promote patient well-being and avoid orthodontic therapy withdrawal, this review intended to identify, via an analysis of the clinical literary works, the very best method for taking care of orthodontic pain.

METHODOLOGY:

We performed comprehensive search using biomedical databases; Medline, and Embase, for studies concerned with management of orthodontic pain published with English language up to, October 2018. keywords used in our search through the databases were as; “orthodontic pain”, “Management of dental pain”. More relevant articles were recruited from references lists scanning of each included study.

DISCUSSION:

• Orthodontic causes of pain — what are they?

It is obvious from the presenting literary works that all orthodontic treatments such as separator positioning, archwire placement and activations, application of orthopaedic forces and debonding generate pain in patients. It is likewise transparent that taken care of appliances generate even more pain than removable or practical appliances and there exists little correlation in between applied force magnitude and ache experienced.

The different discomforts experienced by patients after appliance positioning are commonly explained by them as sensations of pressure, tension, discomfort of the teeth, and pain as such [3]. Clinicians normally reply to one of the most frequently asked question 'Will it injure?' with the answer 'There might be some pain connected with all orthodontic treatments such as placement of separators, archwire placement and activations, elastic wear and debonding '. The two most important parts of orthodontic pain-- its duration and strength are commonly overlooked. It is understood that the above-mentioned procedures will cause ache yet what is not known is 'why they create ache?' It is reported that orthodontic procedures will reduce the proprioceptive and discriminating abilities of the patients for approximately 4 days, which cause lowering of the pain threshold and disturbance of regular devices connected with proprioception input from nerve endings in the periodontal ligament (PDL) [4]. At the same time, there will be pressure, ischaemia, inflammation, and oedema in the PDL spot [5].

Burstone reported a prompt and postponed excruciating reaction after orthodontic force application [6]. He associated the initial action to compression and the postponed reaction to hyperalgaesia of the PDL. This hyperalgaesia has actually been related to prostaglandins (PGEs), which make the PDL conscious released algogens such as histamine, bradykinin, PGEs, serotonin, and substance P [7]. It is clear that all orthodontic treatments will produce tension and compression sectors in the PDL space resulting in a painful experience for the patients.

Orthodontic separation and pain. An electromyographic (EMG) research [8], done to assess the motor and sensory changes associated with separator placement, revealed a reduction in motor output along with pressure pain threshold in muscular tissues of mastication. They suggested this to be a safety mechanism against additional damage to the hurt part of the masticatory system. It is clear that ache is connected with the procedure of orthodontic separation and starts within 4 hours of its placement with a peak level at day 2 that might last for 7 days.

Archwire placement and activation. A literature search concerning pain understanding adhering to archwire activation caused few publications. Gianelly and Goldman mentioned that the conditioned and/or nociceptive reflexes generated as a result of orthodontic archwire activation commonly causes avoidance of eating difficult foods by the patients [9]. Smith et al. and Goldreich et al, through various

experiments, examined the effect of orthodontic archwire activation on the masseter muscular tissue via EMG task [10], [11]. They observed a reduction in masseter muscle mass activity and associated this to the harmful stimulations emulating from the periodontal membrane layer or paradental receptors causing a reflex device, which caused inhibition of jaw-closing muscular tissues (EMG activity throughout induced pain has actually been revealed to boost when jaw closing muscle mass function as antagonists). In brief, both archwire positioning as well as activation will certainly cause pain and could impact dietary habits as well as the everyday life activities of patients.

Appliance type. The impact of different appliances (taken care of and removable) on ache experience has been reviewed. Oliver and Knapmann found no difference in the degree of discomfort created by dealt with or detachable appliances [12]. Sergl et al. contradicted this searching for and specified that dealt with and functional appliances generated a greater intensity of discomfort than detachable appliances [13]. Patients wearing fixed appliances reported greater values for intensities of pressure, stress, discomfort, and level of sensitivity to teeth.

Debonding. Williams and Bishara examined the limit degree for patient pain at debonding and ended that tooth flexibility and pressure application were the two crucial affecting aspects [14]. They discovered invasive pressures to produce less pain at debonding in contrast with forces applied in a mesial, distal, face, lingual, or extrusive direction. They suggested applying finger stress or asking the patient to attack on an item of cotton roll to minimize discomfort while debonding.

- **Management methods of orthodontic pain**
Pharmacological Management

A number of studies reviewed the relevance of pharmacological management of soreness during orthodontic therapy. Angelopoulou et al. conducted a meta-analysis to review the effect of non-steroidal anti-inflammatory drugs (NSAIDs) in taking care of soreness. Of the 1,127 studies, seven were included. No statistically considerable difference was identified between ibuprofen and paracetamol (acetaminophen) administration in eliminating soreness. It was evident from the literature that ibuprofen lowered ache at two hours and six hours after intervention yet not at 24 hours when ache comes to a head. Somewhat, ibuprofen soothes soreness in the first phase of therapy [15]. A testimonial by Possi and Gallelli described the function of ibuprofen in orthodontic ache management and the authors concluded that

ibuprofen 400 mg, if taken one hour previously, three hours after, and seven hours postoperatively, substantially lowered ache. Nonetheless, extra doses of ibuprofen were recommended after the seven-hour dosage to maintain the benefits of the medicine when pain peaks at 24 hours after intervention. Thus, it was taken into consideration a risk-free and effective medicine compared to other NSAIDs and additionally had fairly fewer negative impacts. Some medical professionals sustained that NSAIDs had no impact on tooth motions as they were carried out in reduced doses and for a much shorter duration. Therefore, in healthy individuals they are gotten rid of by the body prior to tooth motion happens. On the contrary, other writers stated a hold-up in orthodontic tooth movements as a result of NSAID consumption [16].

A record based on a literary works review states that NSAIDs hinder tooth activity and additionally increase the threat of root resorption. As a result, paracetamol (acetaminophen) was considered the safest NSAID that had no impact on the series of tooth motions in addition to root resorption and other negative impacts that could happen within the oral cavity [15]. Nevertheless, a lot of what has been released on this subject is still debatable.

On the other hand, preoperative analgesics were discovered to be reliable in reducing pain and discomfort after treatment in patients with dental anxiousness and anxiety. An additional research sustained that premedication with piroxicam 20 mg substantially decreased ache in contrast to ibuprofen 400 mg. The management of piroxicam 20 mg one hour prior to separator placement was advised [17]. A research study was performed on 51 participants to assess the impacts of a single dosage of anti-inflammatory medicine to preemptively treat orthodontic ache. The authors concluded that the use of a single dose of medicine (lumiracoxib 400 mg) was not appealing in preemptive orthodontic pain management. However, pain intensity was supposedly lower in people getting the placebo group [17].

A study compared the preoperative administration of traditional NSAIDs (ibuprofen and acetaminophen) to meloxicam. Meloxicam carried out at a dosage of 7.5 mg was as effective as acetaminophen 650 mg and ibuprofen 400 mg in controlling orthodontic discomfort. Acetaminophen was proclaimed the treatment of selection, as the medication had no gastrointestinal tract (GIT) toxicity and did not impede tooth movements. Nevertheless, meloxicam, which has the least GIT poisoning, can be an

alternative option for patients in whom NSAIDs are contraindicated [18].

In a recent research study by M. Abu Al-Melh and Andersson [18], the impact of lidocaine/prilocaine topical anesthetic was examined on ache and discomfort credited to the insertion of elastomeric separators. Therefore, the total mean discomfort/pain rating was discovered to be significantly lower ($p < 0.001$) with the topical anesthetic as compared to the placebo group. As a result, this approach might be valuable for patients with a low pain threshold as it could potentially ease ache and pain after the positioning of orthodontic elastomeric separators.

Non-Pharmacological Management

Other treatment methods in orthodontic therapy consist of chewing gum and biting on wafers. A research study was performed on 57 orthodontic patients to establish whether the use of chewing gum lowered the effect and soreness triggered by repaired orthodontic appliances. The difference in between the typical overall effect score at 24 hours was 16 ($p = 0.031$), and the typical VAS in between the two groups was 25 mm at 24 hours ($p = 0.038$). Hence, the authors surmised that chewing gum substantially reduced both the effect and ache from repaired orthodontic appliances. There was no proof that chewing gum increased the incidence of appliance damages [19], but this is a controversial issue since patients are typically encouraged to stay clear of chewing gum throughout orthodontic treatment. On the other hand, a research study created to evaluate the discomfort response between both groups located that discomfort management in the bite wafers group was not inferior to that of the over-the-counter (OTC) group ($p > 0.39$). Consequently, BW (bite wafers) were also taken into consideration as efficient as OTC analgesics for pain control in adolescents [20].

A recent research was launched to check out the effect of sugar-free chewing gum versus ibuprofen on reported ache in orthodontic patients. Patients were separated into two groups: a control group (ibuprofen only) and an experimental group (allowed to utilize ibuprofen if called for along with the chewing gum). To conclude, sugar-free chewing gum might minimize the degree of ibuprofen use in the experimental group. Nevertheless, it has no clinical/statistical significant effect on bond failings [19]. A study demonstrated that the use of systemic acupuncture preoperatively by certified professionals can lower discomfort in both male and female patients. For this reason, it was considered a secure technique of ache control.

Furthermore, research studies have actually stressed that mental perspective and behavior management could help in avoiding pain in orthodontic patients. Studies concentrated on the concept of developing good orthodontist-patient interaction. Discomfort can be prevented if orthodontists explain and assist their patients about anticipated ache during treatment [15], [18]. In the very same line, cognitive behavior modification was effective hurting control during the initial stages of orthodontic treatment. In addition, patients that had a higher personal understanding of their pain intensity and demonstrated perspectives feature for interior control alignment appeared to adapt faster and experience much less pain and discomfort throughout active treatment. An additional research was made to assess patients' anticipation of pain and its adverse effects before orthodontic treatment and self-reported discomfort after archwire placement. The authors wrapped up that patients undervalued the dietary adjustments they would certainly need to make due to post-archwire placement, and those that expected a better result of discomfort reported experiencing a greater intensity of pain and a higher negative impact of pain on their way of living [9], [10]. Nonetheless, a recent data source search exposed that the high quality of evidence for non-pharmacological treatments to manage orthodontic pain was very reduced. More potential study with lengthy follow-up is required.

Low-level laser treatment (LLLT) had been introduced earlier as an additional therapy method for orthodontic discomfort control. Besides its analgesic impact, LLLT enhances tissue recuperation and speeds up tooth movement. Several studies have talked about the proposed advantages of this therapy method. A meta-analysis was conducted, and out of 186 results, just 14 randomized clinical trials (RCTs) with an overall of 659 individuals satisfied the incorporation standards. The results showed that diode LLLT substantially reduced pain by 39% contrasted to the placebo groups ($p = 0.02$) [21]. Nonetheless, researches were unable to give enough evidence to support the effectiveness of LLLTs. Additionally, research with much better styles and ideal samples ought to be conducted to recommend the use of LLLT.

Single-dose, helium-neon laser therapy was found to be efficient in reducing orthodontic pain in patients with maxillary canine retractions. The treatment contributed to a 12.1% discomfort decrease compared to the placebo group. However, the study had its very own limitations, and no previous studies had investigated the performance of helium-neon laser therapy versus other laser types [21].

A recent methodical review demonstrated that LLLT could boost orthodontic treatment by increasing tooth movements and modulating sharp pain, as well as protecting against regression. The top quality of clinical proof that supported LLLT usage in modulating acute pain was low. Further research with robust research designs and conformity of laser approaches will be called for to reveal the well worth of LLLTs in contemporary times as a routine approach of orthodontic pain control [22]. Bayani and colleagues made a study assessing the effectiveness of ibuprofen, bite wafer and low power red and infrared lasers in orthodontic pain management. The writers concluded that a solitary session from a reduced power infrared laser was one of the most reliable and ideal technique for pain alleviation in orthodontic patients following archwire positioning. However, on the contrary, reduced power red laser irradiation was not recommended. Chewing on bite wafers could be utilized as an alternate option to ibuprofen [23]. Analgesics and laser irradiation remained effective in the management of orthodontic discomfort at its top strength amongst all utilized treatments. However, additional study is called for to boost the top quality of proof.

Most importantly, nutritional modifications are needed during orthodontic treatment. Patients need to be encouraged towards much healthier dietary habits. A study was developed with 180 patients to compare dietary intake in between orthodontic patients and control topics. The authors ended that orthodontic patients consumed higher total calories, proteins, and carbohydrates ($p > 0.05$) and considerably reduced fiber, chromium, and beta-carotene ($p < 0.05$) compared with the control group [25]. Riordan reported the effect of orthodontic therapy on dietary consumption. An overall of 10 teenage patients were included in the study. The aim was to compare nutrient consumption before and after orthodontic therapy. Recorded diet plans were assessed making use of a two-sample t-test with an alpha degree of 0.05. The results showed a decrease in copper and magnesium consumption after orthodontic adjustments [24]. A qualitative research study was performed on 10 teenage patients (four males, six females) to examine the early results of dealt with orthodontic therapy on nutritional intake and actions. Finally, the dietary practices of patients were transformed as a result of pain. For that reason, orthodontists must supply nutritional assistance to their patients including boosting consumption of soft diets to prevent stress sensitivity [25]. Nevertheless, both research studies were restricted by their small sample size. Finally, a braces-friendly diet has to be

advised by all the orthodontists. Furthermore, basic dentists should additionally considerably contribute to providing oral hygiene and dietary support to patients undergoing orthodontic therapy.

CONCLUSION:

Discomfort is a subjective feedback, which shows huge individual variations. It is dependent upon factors such as age, gender, specific pain limit, the magnitude of the force applied, existing mood and stress and anxiety, cultural distinctions, and previous pain experiences.

Effective orthodontist-patient interaction and targeted dietary advice may assist in avoiding discomfort and discomfort experienced by the patients somewhat. Nonetheless, based on the offered literary works, analgesics stayed the effective and regular technique of pain management. Moreover, while prescribing analgesics, orthodontists must know the pharmacological activity as well as the benefits and drawbacks associated with each medication. An optimum advised dosage must be considered for each and every patient. Patients with special conditions such as emotional discomfort or trigeminal neuralgia typically call for cooperation with their experts and advanced care management. Alternate nonpharmacologic methods for orthodontic pain control are likewise effective and can expand the clinician's variety of alternatives in the look for much better patient care. Nevertheless, discomfort management is a complex sensation. As a result, more examinations integrating different techniques of orthodontic pain control with proper research study designs and big example dimensions are required.

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