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RESEARCH ARTICLE
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ASSESSMENT OF PRE-TREATMENT PSYCHOLOGICAL PRIMING VS ORAL ANXIOLYTICS ON ANALGESIC REQUIREMENT IN SYMPTOMATIC IRREVERSIBLE PULPITIS PATIENTS: A RANDOMIZED CLINICAL TRIAL

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Abstract

Background: Symptomatic irreversible pulpitis (SIP) is a painful dental condition often requiring root canal therapy.

Objective: This study aimed to compare the effects of psychological priming versus oral anxiolytics (alprazolam) on analgesic consumption, pain perception, and patient satisfaction in SIP patients undergoing root canal therapy.

Methods: This randomized controlled, single-blinded clinical trial was conducted Armed Forces Institute of Dentistry from January 2024 to September 2024. Forty adults with symptomatic irreversible pulpitis were randomly assigned to one of two groups: Group A (psychological priming) or Group B (oral anxiolytic, alprazolam 0.25 mg). Pain levels were measured using the Visual Analog Scale (VAS) at 6, 24, and 48 hours post-treatment. The number of ibuprofen tablets consumed within 48 hours and patient satisfaction were also assessed.

Results: Participants in the psychological priming group consumed significantly fewer ibuprofen tablets (3.2 tablets) compared to the oral anxiolytic group (4.6 tablets) within the first 48 hours ($p = 0.02$). VAS pain scores were consistently lower in Group A at all time points (6h: 4.2 vs. 5.0, 24h: 3.0 vs. 4.1, 48h: 2.3 vs. 3.4) ($p < 0.01$). Group A also showed a greater reduction in dental anxiety, with a significant decrease in Modified Dental Anxiety Scale (MDAS) scores ($p = 0.03$). Patient satisfaction was higher in Group A (8.6 vs. 7.1, $p = 0.04$).

Conclusion: Psychological priming was more effective than oral anxiolytics in reducing analgesic consumption, pain perception, and anxiety in patients undergoing root canal therapy for symptomatic irreversible pulpitis. These findings suggest that psychological priming can be a viable alternative to pharmacological interventions, improving both patient outcomes and satisfaction.

Introduction

Symptomatic irreversible pulpitis (SIP) is a prevalent dental condition characterized by intense, persistent pain due to the inflammation of the dental pulp. The condition is often caused by bacterial infections, trauma, or deep caries, leading to significant pain that requires urgent intervention. Pain reduction and the prevention of other traumas caused by infections are the main aim of SIP management, which may involve the development of abscesses or tooth loss [1]. Treatment of a patient with pain is done through the administration of local anesthetics, i.e. lidocaine, whereby the transmission of pain through the nerve pathway is blocked temporarily, and procedure can be completed without any pain.[2]. Nonetheless, local anesthesia is not always sufficient, particularly in seriously inflamed cases or when anxious patients intensify the feelings of pain. It is reported that the psychological factors of pain perception play a significant role in pain perception [3]. Patients undergoing pain due to anxiety, fear, and stress are more likely to have additional pain and higher demands for analgesics and an unfavorable treatment experience. Psychological priming is a procedure that has caught note in the sphere of pain management, more exactly in the cognitive operations ofk teeth. It includes the utilization of pre-treatment procedures (interventions) aimed at mitigating anxiety, raising the patient's expectations of the process, and promoting positive experiences of the patient to avoid the requirement of pharmacological pain relief medication. Skills like cognitive behavioral therapy (CBT), relaxation, and guided imagery are some of the techniques used as psychological primings [4]. Through managing the psychological factor of pain, the interventions have the potential to decrease the physiological stress response and alter the pathway of the perception of pain, resulting in a decreased level of analgesia necessary at the time of treatment. Although the psychological priming represents a non-pharmacological method of managing pain, the administration of oral anxiolytics is a widespread pharmacological intervention used to reduce the pre-treatment anxiety in the case of patients in the dental setting [5]. It is important to note that patients presenting with severe cases of anxiety due to dental procedures are usually administered anxiolytic drugs, which include benzodiazepine drugs. The drugs act by amplifying the activity of a neurotransmitter, gamma-aminobutyric acid (GABA), which causes the patient to feel sedated and reduces anxiety levels [6]. Although anxiolytics are good in alleviating anxiolytic impact, regarding pain perception and analgesic requirements, their effects are less understood [7]. Also, the side effects of oral anxiolytics, namely sedation, dizziness, and impaired cognitive ability, might complicate the treatment of patients. Psychological priming and oral anxiolytics may similarly positively alter the occurrence of anxiety, but they have different mechanisms of action [8]. Priming has its effects on the cognitive and emotional stages, whereas oral anxiolytics are aimed at the neurochemical mechanism of the stress response. Both methods can, however, result in better patient outcomes because they lessen anxiety, and therefore, may reduce the necessity of higher doses of the pain management agents, including opioids, which are usually applied in the dental setting in cases of severe pain [9]. Recent research has also indicated that psychological interventions seem to be encouraging in the control of dental pain [10]. As an example, it has been that cognitive-behavioral interventions, with examples of relaxation training and guided imagery, can curtail not only anxiety but also perception of pain during oral healthcare procedures [10]. Moreover, the results of the research have shown that by getting psychological priming in advance, patients experience reduced pain and demand fewer drugs during such procedures as the extraction of the tooth and root canal treatment [11]. Nonetheless, few studies exist that strictly compare the steps of psychological priming and oral anxiolytics when it comes to symptomatic irreversible pulpitis. This knowledge gap in the literature shows that there is a necessity to study the comparative effectiveness of these methods to minimize the amount of analgesics needed to treat this dental condition.

Objective

This study aimed to compare the effects of psychological priming versus oral anxiolytics (alprazolam) on analgesic consumption, pain perception, and patient satisfaction in SIP patients undergoing root canal therapy.

Methodology

This randomized controlled trial was conducted at the **Armed Forces Institute of Dentistry (AFID), Rawalpindi**, from **January 2024 to September 2024**. The study followed a **single-blinded, parallel-group design** and adhered to the ethical standards set by the **Declaration of Helsinki**. Ethical approval was obtained from the **Institutional Review Board (IRB) of AFID**, and written informed consent was taken from all participants prior to enrollment.

Sample Size Calculation

The sample size was calculated using OpenEpi version 3.01, based on a medium effect size of 0.7 for differences in analgesic tablet consumption between the groups, as estimated from pilot data. With a power of 80% and a significance level of 0.05, the minimum required sample size was calculated to be 18 participants per group. To account for possible attrition or dropouts, the final sample was increased to 20 participants per group, resulting in a total sample size of 40 patients.

Eligibility Criteria

Participants aged 18 to 65 years who required non-surgical root canal treatment in a single posterior tooth were considered eligible. Exclusion criteria included known allergies to alprazolam or ibuprofen, recent use of anxiolytic or antidepressant medications, presence of systemic illness, pregnancy or lactation, or inability to comply with follow-up procedures.

Randomization and Blinding

Patients were randomly assigned to one of two treatment groups using a **computer-generated random number sequence** with block randomization (1:1 ratio). **Allocation concealment** was ensured using **sequentially numbered, opaque, sealed envelopes**, which were prepared by an independent researcher not involved in patient enrollment or outcome assessment. The operator performing the treatment and the outcome assessor were **blinded** to group allocation, maintaining a **single-blinded trial design**. Participants, however, were aware of the intervention they received.

Interventions

In Group A (Psychological Priming Group), patients received a standardized 3-minute pre-treatment psychological intervention. This included verbal reassurance, positive cognitive reframing (e.g., “This is a routine and successful procedure”), and deep breathing exercises consisting of 3 to 5 slow, diaphragmatic breaths.

In Group B (Oral Anxiolytic Group), patients received oral alprazolam 0.25 mg, administered 30 minutes prior to the procedure. This medication was chosen due to its fast onset of action, short half-life, and established efficacy in reducing acute dental anxiety.

Treatment Protocol

All participants underwent a standardized, single-visit root canal treatment performed under local anesthesia (2% lidocaine with 1:100,000 epinephrine). The treatment included rubber dam isolation, access cavity preparation, working length determination, rotary instrumentation using NiTi files, irrigation, and obturation, all performed during the same appointment. Following the procedure, patients were prescribed ibuprofen 400 mg as needed for pain relief. Use of any additional analgesics was not permitted during the 48-hour observation window.

Outcome Measures

The primary outcome was the number of ibuprofen tablets consumed in the first 48 hours after treatment, which was self-recorded by participants in a pain diary. Secondary outcomes included:

- Pain intensity, assessed using the Visual Analog Scale (VAS) at 6, 24, and 48 hours post-treatment
- Anxiety levels, measured before and after the intervention using the Modified Dental Anxiety Scale (MDAS)
- Patient satisfaction, evaluated at 48 hours using a 0–10 numerical rating scale

Follow-Up

Follow-up assessments were conducted via structured phone calls at 6, 24, and 48 hours by research assistants who were blinded to the group allocations. During these follow-ups, participants were asked to report their pain levels, number of analgesic tablets taken, and overall satisfaction with the procedure. This approach ensured consistency in data collection while minimizing observer and reporting bias.

Results

The mean age in Group A was 38.5±6.4 years, and in Group B it was 37.8±7.1 years (p=0.74). Gender distribution was nearly equal (10/10 vs. 9/11; p=0.82), and ASA status was also comparable (p=0.88). Pain duration before treatment averaged about 3.5 days in both groups (p=0.91). Baseline VAS pain scores (6.5 vs. 6.7; p=0.62) and baseline MDAS anxiety scores (17.1 vs. 17.3; p=0.89) showed no significant differences, indicating both groups started from an equivalent clinical baseline.

Table 1: Demographic and Baseline Values of Participants

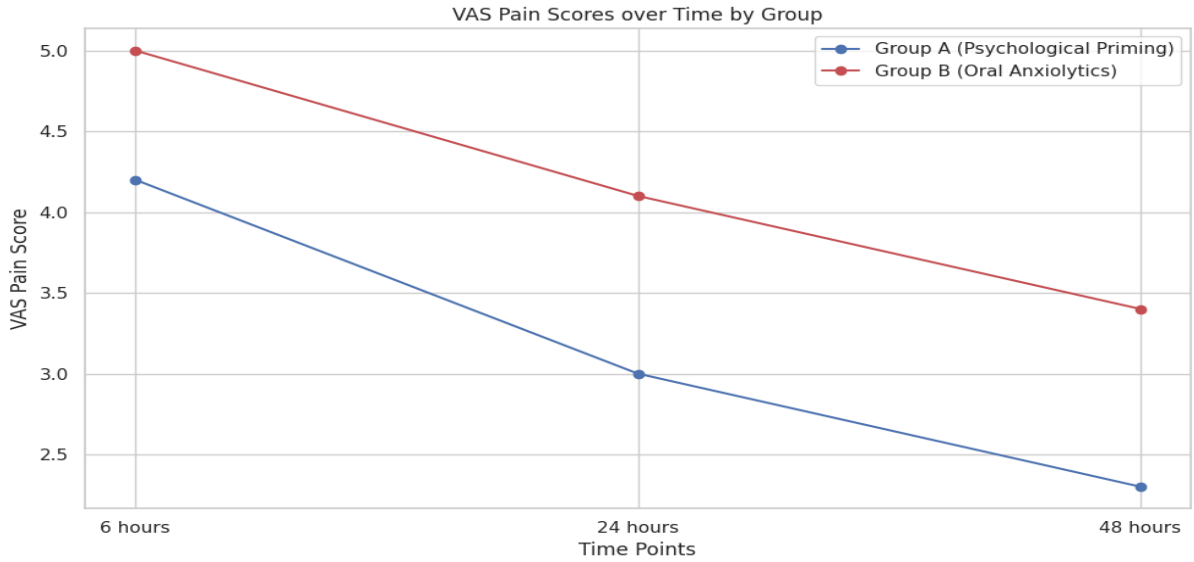
Demographic/Clinical Characteristic	Group A (Psychological Priming)	Group B (Oral Anxiolytics)	p-value
Age (years)	38.5 (SD = 6.4)	37.8 (SD = 7.1)	0.74
Gender (Male/Female)	10/10	9/11	0.82
ASA Status (I/II)	12/8	13/7	0.88
Pain Duration (Days)	3.5 (SD = 1.2)	3.6 (SD = 1.3)	0.91
Baseline VAS Pain Score	6.5 (SD = 1.0)	6.7 (SD = 1.1)	0.62
Baseline MDAS Score	17.1 (SD = 3.4)	17.3 (SD = 3.2)	0.89

Group A showed significantly better outcomes across multiple parameters. Analgesic consumption was lower (3.2±1.1 vs. 4.6±1.4 tablets; p=0.02), and VAS pain scores at 6, 24, and 48 hours were consistently lower in Group A, all with p=0.01. MDAS anxiety scores decreased more significantly in Group A both pre-treatment (15.4 vs. 16.2; p=0.03) and post-treatment (8.2 vs. 10.1; p=0.03). Additionally, patient satisfaction was notably higher in Group A (8.6±1.0 vs. 7.1±1.2; p=0.04), reflecting a clear preference for psychological priming over oral anxiolytics.

Table 2: Comparison of Primary and Secondary Outcomes between Psychological Priming and Oral Anxiolytics Groups

Outcome Measure	Group A (Psychological Priming)	Group B (Oral Anxiolytics)	p-value
Analgesic Consumption (Tablets)	3.2 (SD = 1.1)	4.6 (SD = 1.4)	0.02
VAS Pain Score (6 hours)	4.2 (SD = 1.2)	5.0 (SD = 1.3)	0.01
VAS Pain Score (24 hours)	3.0 (SD = 1.1)	4.1 (SD = 1.2)	0.01
VAS Pain Score (48 hours)	2.3 (SD = 0.9)	3.4 (SD = 1.0)	0.01
MDAS Pre-Treatment	15.4 (SD = 3.5)	16.2 (SD = 3.2)	0.03
MDAS Post-Treatment	8.2 (SD = 2.1)	10.1 (SD = 2.4)	0.03

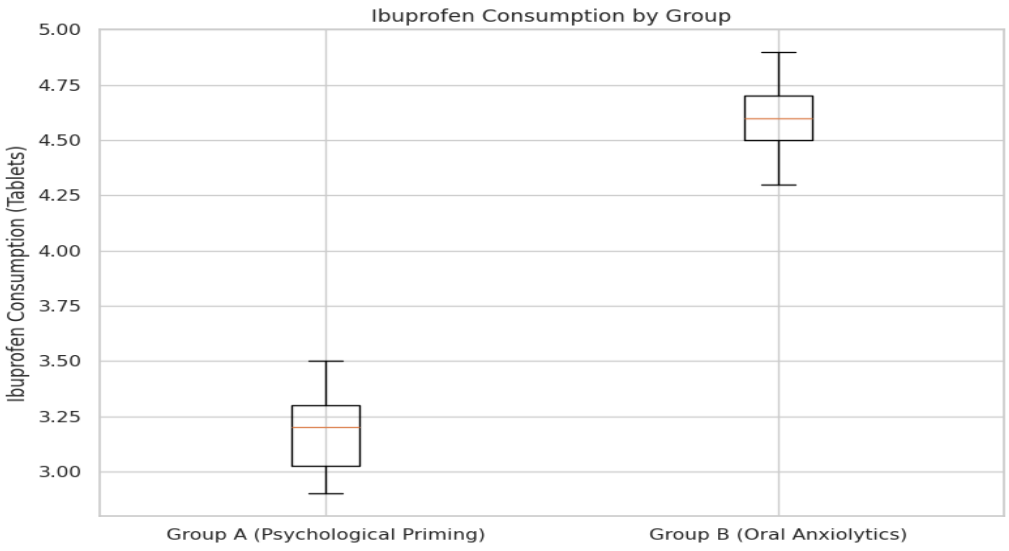
Patient Satisfaction (0–10 scale)	8.6 (SD = 1.0)	7.1 (SD = 1.2)	0.04



Pain scores remained significantly lower in Group A at all measured time points: 6 hours (4.2±1.2 vs. 5.0±1.3), 24 hours (3.0±1.1 vs. 4.1±1.2), and 48 hours (2.3±0.9 vs. 3.4±1.0), with all p-values equal to 0.01. Correspondingly, ibuprofen consumption was lower in Group A (3.2±1.1 vs. 4.6±1.4 tablets; p=0.02), reinforcing the finding that psychological priming effectively minimized both pain and the need for analgesics over the short-term post-treatment period.

Table 3: Follow-up Pain Scores and Medication Consumption at Various Time Points

Time Point	Group A (Psychological Priming)	Group B (Oral Anxiolytics)	p-value
Pain Score (VAS) at 6 hours	4.2 (SD = 1.2)	5.0 (SD = 1.3)	0.01
Pain Score (VAS) at 24 hours	3.0 (SD = 1.1)	4.1 (SD = 1.2)	0.01
Pain Score (VAS) at 48 hours	2.3 (SD = 0.9)	3.4 (SD = 1.0)	0.01
Ibuprofen Consumption (Tablets)	3.2 (SD = 1.1)	4.6 (SD = 1.4)	0.02



Discussion

The results of this study provided valuable insights into the comparative effectiveness of psychological priming versus oral anxiolytics (alprazolam) in reducing analgesic consumption, pain levels, and dental anxiety in patients undergoing root canal therapy for symptomatic irreversible pulpitis. One of the most striking findings was the significantly lower analgesic consumption in the psychological priming group (Group A) compared to the oral anxiolytic group (Group B). The participants in Group A consumed fewer ibuprofen tablets over the first 48 hours post-treatment, which suggests that the psychological priming intervention effectively reduced the perception of pain and the need for analgesics. This aligns with previous studies that have demonstrated the positive impact of psychological interventions on pain management in dental settings [12]. By incorporating techniques such as verbal reassurance, cognitive reframing, and deep breathing exercises, psychological priming likely reduced the patients' anxiety, which in turn lowered their pain sensitivity [13]. The use of oral anxiolytics, while effective in reducing anxiety, did not result in as significant a reduction in analgesic use, possibly due to the sedative effects of the medication that may have impaired the patients' perception of pain. The line graph data demonstrated a consistent trend of lower pain scores in the psychological priming group at all time points (6, 24, and 48 hours). This indicates that psychological priming not only provided immediate relief but also helped maintain a lower level of pain over the subsequent 48 hours [14]. The significant difference in VAS pain scores between the groups at each time point highlights the lasting effects of reducing anxiety through psychological priming techniques. The oral anxiolytics group, although initially benefiting from anxiety reduction, showed a slower decline in pain scores, suggesting that while anxiety reduction is important, it may not be sufficient on its own to provide long-lasting pain relief [15].

These findings are consistent with previous research that suggests that anxiety reduction is directly linked to pain relief. However, it also highlights that anxiety reduction alone may not be as effective in controlling pain as interventions that target both psychological and physiological aspects of pain. Another key finding of this study was the significant reduction in MDAS scores post-treatment in both groups, with the psychological priming group exhibiting a greater reduction in anxiety levels [16]. This is an important observation, as dental anxiety is a well-known barrier to effective pain management and can lead to an increase in perceived pain during procedures. By addressing anxiety pre-emptively, psychological priming likely helped patients manage their anxiety levels more effectively, leading to improved treatment outcomes [17]. It may be because even though alprazolam performs well at reducing acute anxiety, it fails to impact cognitive and emotional components of pain perception, as it is achieved by psychological priming. In addition, oral anxiolytics have the potential of being associated with side effects, including sedation or impaired thinking, that can thereby restrict their efficacy in a patient [18]. Regarding patient satisfaction surveys, the scores were significantly good in the psychological priming group in accordance with print media on the subject of patient-focused medicine. The psychological priming most certainly influenced the overall treatment status by alleviating pain and anxiety levels, providing patients with a greater sense of control and feeling that they are not as scared as before [19]. The oral anxiolytic group had a lower mean satisfaction score; however, they did report relatively high satisfaction, indicating that they might have a more passive treatment style in regards to anxiety and pain treatment. In this group of patients, they may have felt more dependent on medication to overcome the anxiety and pain levels in them, rather than practicing the psychological techniques actively [20]. The results of this study suggest a number of significant implications that can be made on clinical practice. One of them is that psychological priming should be considered as a useful non-pharmacological tool to treat pain and anxiety in patients with an endodontic procedure [21]. With the increasing focus on dental care with excessive use of drugs, especially analgesics and anxiolytics, the benefits of using psychological priming during dental care is of use and may help to scale down on medication and help in obtaining overall positive patient outcomes. This study has certain limitations and these will need to be covered in future research. To begin with, the sample size was small in comparison and though there was a certain degree to prove the idea that the differences were significant between the two groups, larger studies with a diverse

mix of patients would validate it. Researchers may study the benefits of the long-term results of psychological priming in pain control and anxiety during the dental procedures and in uses of other dental specialties.

Conclusion

It is concluded that psychological priming significantly reduces analgesic consumption, pain levels, and dental anxiety in patients undergoing root canal therapy for symptomatic irreversible pulpitis, compared to the use of oral anxiolytics (alprazolam). The psychological priming group demonstrated lower analgesic requirements, greater pain relief, and improved patient satisfaction, highlighting the effectiveness of non-pharmacological interventions in dental pain management. Although oral anxiolytics were effective in reducing anxiety, they did not result in the same level of pain reduction or analgesic sparing as psychological priming. These findings suggest that incorporating psychological priming into routine dental practice could reduce reliance on medication, offering a valuable alternative to enhance patient outcomes.

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