

DOI Link: <https://doi.org/10.59671/0A1rq>

Vol. 408, Issue.6, Part.1, June 2025, PP. 40-52

Received April 2025 Accepted May 2025 Published June 2025

Outcome of kinesiology taping on postoperative Complications after third molar surgery – Randomized controlled trial

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Abstract

Aim and Objective:

This study aimed to rigorously evaluate the effectiveness of Kinesio tape in reducing postoperative trismus, edema, and pain following the surgical extraction of mandibular third molars.

Materials and Methods

Patients with an impacted mandibular third molar of similar difficulty index were enrolled and randomly assigned to two groups using a lottery system. The study group received postoperative extra-oral Kinesio tape application, while the control group followed the institutional standard protocol, which included preoperative intravenous Dexamethasone (8 mg). The clinical outcome parameters assessed were: Postoperative edema, mouth opening, and pain. Statistical analysis was performed using descriptive statistics and independent t-tests ($p < 0.05$) with SPSS 26.0 (SPSS Inc., Chicago, IL).

Results

A total of 40 patients (17 males and 23 females) with a mean age of 22.7 years were enrolled in the study. Both groups exhibited comparable postoperative edema. Mouth opening was observed to be normal in both groups by the third and seventh postoperative days. However, the steroid group demonstrated greater improvement in mouth opening. Pain levels were similar in both groups on the third postoperative day, with minimal pain reported at the end of the first week [Mean VAS: 2.3 (test group) vs 1.5 (control group)].

Conclusion

Kinesio taping, when used alongside anti-inflammatory medications, is a non-invasive and effective approach for managing postoperative pain and edema while aiding mouth opening recovery. However, steroid therapy demonstrated superior outcomes, particularly in enhancing mouth opening. Further research is warranted to explore the long-term benefits and potential synergistic effects of these treatment modalities.

Key words - Impacted third molar, Minor oral surgery, Non-invasive, Kinesio Tape, Edema

Introduction

The surgical extraction of impacted mandibular third molars is a routine procedure typically performed under local anesthesia. The postoperative phase can bring about significant pain and distress, influencing the overall patient experience. Frequent complications that may ensue after third molar surgery encompass pain, swelling, trismus, and the development of a dry socket. Analgesics play a crucial role in managing postoperative pain, with widely used options including non-steroidal anti-inflammatory drugs (NSAIDs), synthetic opioids like tramadol, and, in some cases, centrally acting opioids such as morphine. The proven effectiveness of these medications in alleviating postoperative pain is well-established [1]. Nonetheless, it's essential to acknowledge that these pharmacological agents are not without potential complications.

The inflammatory cascade plays a crucial role during the postoperative healing process. Pioneering research conducted by Hensch et al. (1949) supported using corticosteroids in patients undergoing oral surgical procedures. Subsequent research has confirmed the effectiveness of corticosteroids in reducing postoperative pain and edema while maintaining their safety profile, allaying initial concerns about complications [2]. The current literature in maxillofacial surgery describes a range of supplementary methods that go beyond pharmacotherapy. These methods include cryotherapy, low-level laser therapy, intraoperative platelet-rich fibrin (PRF) applications, Kinesio tape application, surgical drain placement, and synergistic approaches that integrate these modalities with nonsteroidal anti-inflammatory drugs (NSAIDs) to enhance postoperative patient care.

Recent scientific literature has emphasized the substantial efficacy of kinesio tape in mitigating postoperative morbidity, specifically in reducing pain, edema, and trismus. Notably, these positive outcomes are reported without adverse effects on patients [3]. Kinesio taping, a physiotherapeutic intervention, utilizes the body's innate regulatory mechanisms to promote microcirculation, alleviate tension in the afflicted area, and stimulate lymphatic drainage. Furthermore, it induces analgesic properties by activating the endogenous analgesic system [3, 4]. This observation highlights the effectiveness of Kinesio tape as a technique for addressing complications arising from third molar surgery. Consequently, this research aimed to comprehensively assess the effectiveness of Kinesio tape in mitigating post-operative complications following third molar surgery.

Materials and methods

Study design:

The study was designed as a randomized controlled trial in the Department of Oral and Maxillofacial Surgery, Manipal College of Dental Sciences, Manipal, where patients were randomly allocated into a test group and a control group using a lottery system. The study was conducted after obtaining approval from the Kasturba Medical College, Manipal institutional Ethics Committee (IEC No. 762/2021) and was performed in accordance with the (CONSORT) guidelines. Informed consent from all patients was obtained prior to the surgical procedure.

Inclusion criteria

ASA-1 patients between the ages of 18 and 40 who required surgical extraction of the mandibular third molars and patients consenting to the procedure were included in the research.

Exclusion criteria

Patients who had an active infection, an allergy to tape or medications, a significant medical history including pregnancy, or males who refused to shave their beard were excluded from the study.

Sample size calculation

Based on literature, the difference between the mean (d1-d2) and standard deviation were 0.79 and 0.87 respectively. With a 5% alpha error, 80% of the study require sample in each group was calculated to be 20 [3].

The following formula was used to calculate the sample size

$$(N) = 2 \times (Z_{\alpha/2} + Z_{\beta})^2 / (d1 - d2)^2 \times (SD)^2$$

$Z_{\alpha/2}$ - Type I error (5%) = 1.96, Z_{β} - Type II error (20%) = 0.84 (power of the study = 80%), SD - Standard deviation = 0.87 (from literature), d1-d2 - difference between the mean = 0.79

Surgical procedure

The study enrolled 40 patients, with 20 samples in each group allocated using

the lottery method. As per the study protocol, interincisal mouth opening and edema measurements were taken for all patients before surgery and recorded

after a complete radiographic evaluation. For the control group, preoperative intravenous dexamethasone (8 mg) was administered as per the standard protocol of the institution. Surgical extraction of the tooth was performed under local anaesthesia. For the test group, post-surgery, Kinesio tape (NEYMA Waterproof Non-invasive Kinesiology Sports Tape) was applied to them in a modified web strip fashion [Figure - 1].



Fig.1- Modified Web Strip Technique (vertical direction) extending from Line C (Tragus (T) to exocanthion) to the supraclavicular region along the neck.

Postoperatively, routine antibiotics and NSAIDs were prescribed to all the patients as part of the standard regimen. The removal of Kinesio tape was done on the third postoperative day. For all patients, postoperative edema and trismus measurements were recorded on days three and seven, and a pain assessment was done. Edema and mouth opening were assessed manually using a flexible measuring scale [Figure 2 and 3].

Fig.2 – Markings for measurement of edema



Fig.3 – Interincisal distance for measurement of mouth opening.



Statistical analysis

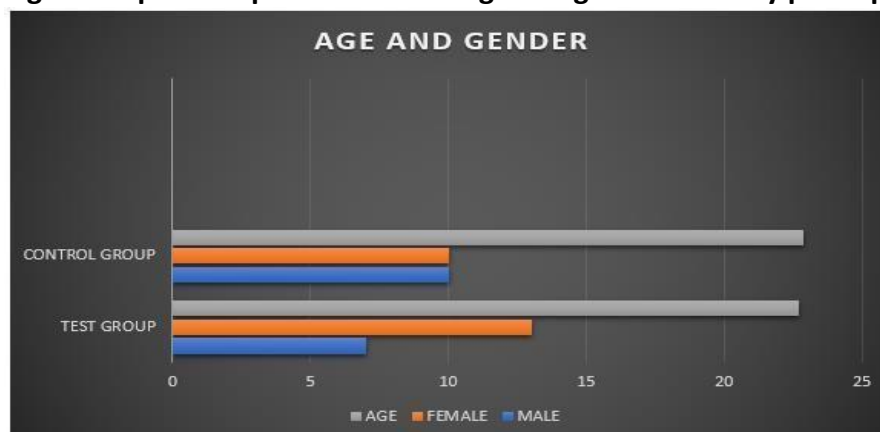
The statistical package SPSS 26.0 (SPSS Inc., Chicago, IL) was used to analyze the data, and the significance level was set at $p < 0.05$. Descriptive statistics were used to evaluate the respective groups' mean and standard deviation. Shapiro Wilkison test was used to determine the normality of the data. As the data had a normal distribution, a parametric test was employed to analyse it. The independent T-test was used in inferential statistics to determine the differences between and within the groups.

Results:

The total number of patients recruited for this study was 40, with 20 in the control group (10 females [50%] and 10 males [50%]) and 20 in the test group [13 females (65%) and 7 males (35%)].

The mean age group was 22.7 in the test group and 22.85 in the control group [Figure 4].

Fig.4 - Graphical representation of age and gender of study participants.

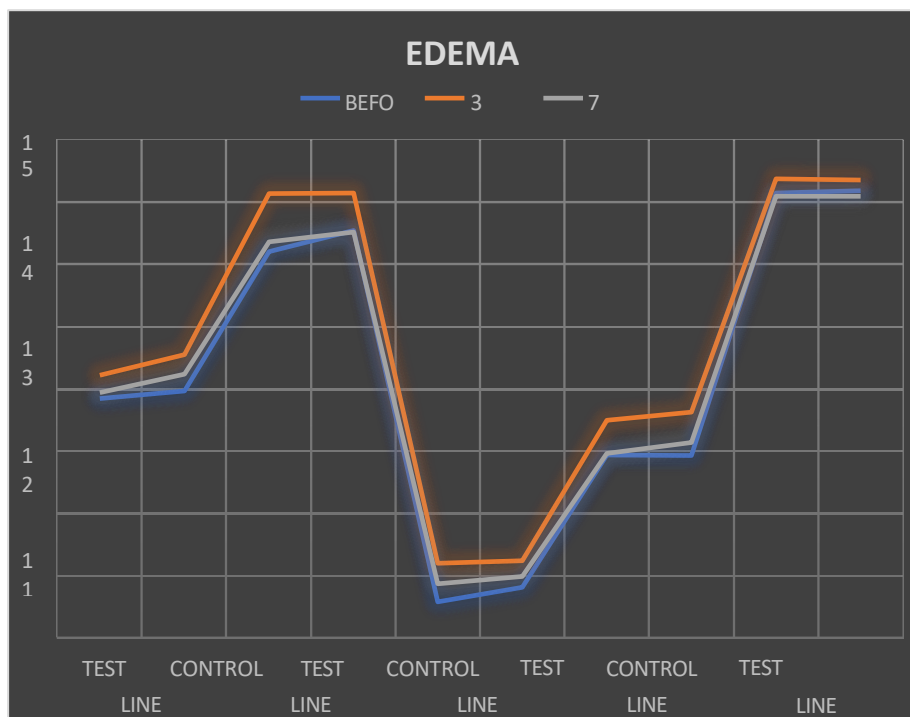


Edema:

Edema was noted post-surgery in all patients in the test and control groups. A decrease in

postoperative edema has been observed in both test and control group patients during postoperative days three and seven, with no statistical significance ($p > 0.05$) between the groups [Figure - 5] [Table 2&3].

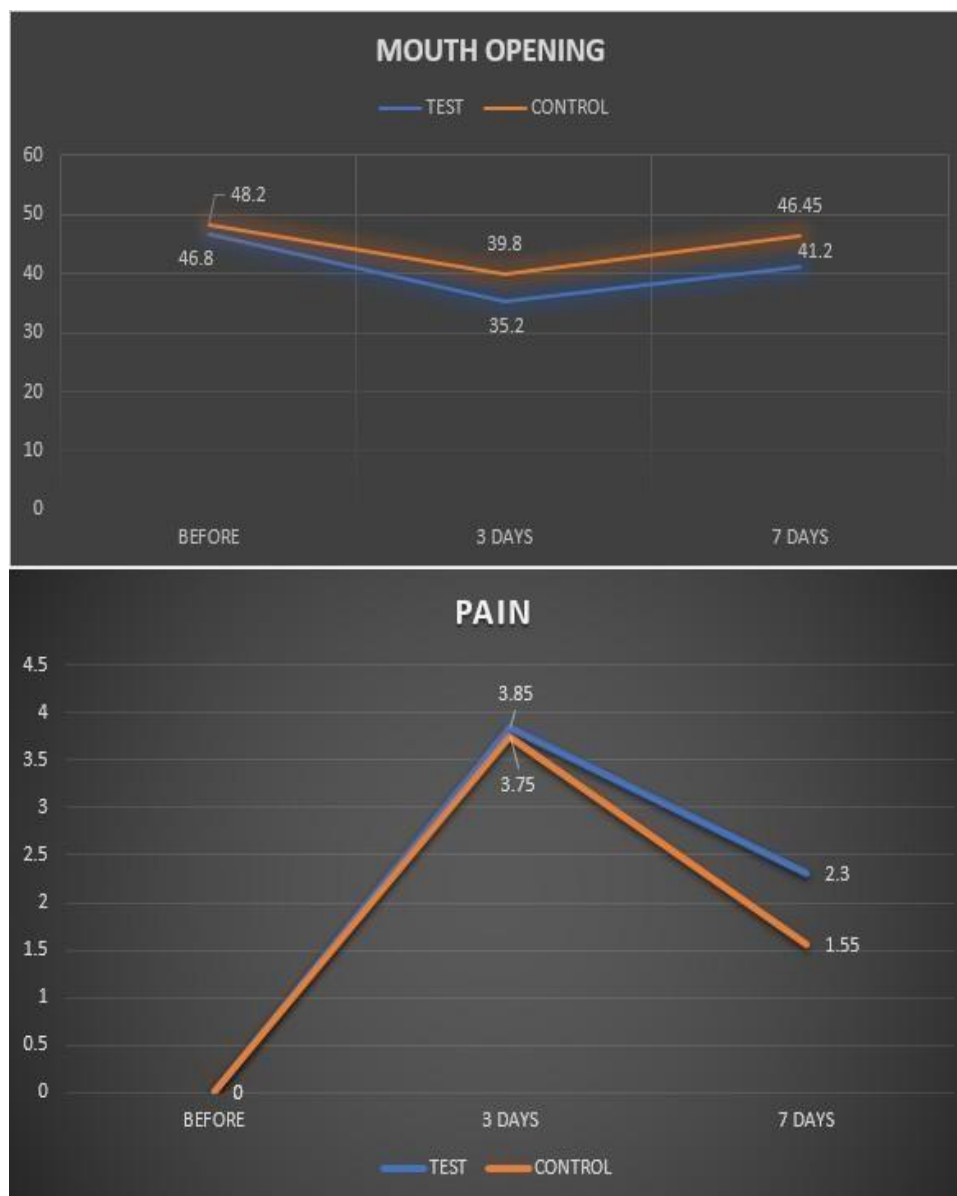
Fig.5 - Graphical representation of edema (Both Test and control groups) result.



Mouth opening

Patients in the control group have increased mouth opening with statistical significance ($p < 0.05$) when compared to the test group during postoperative days three (mean = 39.8 ± 6.12) and seven (mean = 46.45 ± 3.92). An improvement in mouth opening was seen in the test group patients on postoperative day three (mean = 35.22 ± 6.30) and postoperative day seven (mean = 41.2 ± 5.74) [Figure - 6] [Table 4].

Fig.6 - Graphical representation of mouth opening and pain respectively (Both Test and control groups) result.



Pain

It was noted that a statistically significant reduction in pain (as measured by the VAS scale) was observed in the test group patients on postoperative day three (mean = 3.85 ± 1.06) and day seven (mean = 2.3 ± 0.92), respectively, during intra-group analysis ($p < 0.05$). The control group patients also experienced a similar decrease, with mean values of

1.55 ± 0.86 and 3.75 ± 0.69 on postoperative days three and seven, respectively [Figure-6] [Table 5]. Very minimal pain was experienced in both the groups at the end of the first week in both the groups [Mean VAS 1.5 and 2.3 in test and control group respectively]. However patients in the control group had reduced pain compared to the test group, with statistical significance ($p < 0.05$) during postoperative day seven.

Discussion:

The most common surgical intervention undertaken by oral and maxillofacial surgeons is the extraction of third molars. Despite meticulous efforts, inherent challenges are inevitable, potentially leading to adverse outcomes such as pain, inflammation, trismus, and, in some cases, postoperative fever. It is imperative to adopt strategies for the effective management of these symptoms, with a particular emphasis on pain control. Postoperatively, patients typically receive analgesics and anti-inflammatory medications to mitigate pain and discomfort.

Recent research conducted by Dos Santos Canellas et al. in 2022 underscores the favorable impact of corticosteroids, specifically dexamethasone, in alleviating inflammatory complications arising from third molar surgery [4]. In addition, submucosal injections or oral administration of dexamethasone tablets given before surgery are other ways to deal with inflammatory issues in this situation. Kinesio tapes, characterized by their thin, elastic, waterproof composition, offer a non-restrictive application that allows for movement of the treated body part. NEYMA Waterproof Non-invasive Kinesiology sports tape possesses a composition like that of the epidermis with respect to thickness, specific weight, and flexibility. Notably, the tape is predominantly composed of 100% cotton material, incorporating a sinusoidal adhesive structure for optimal airflow.

The pioneering work of Oliver Ristow et al. in 2014 marked the inception of utilizing Kinesio tape post-third molar surgery, a trend subsequently corroborated by Danuta Lietz-Kijak et al. in 2018, A.C.T. da Rocha Heras et al. in 2020, and Tusharbhai et al. in 2021 [5,6,7]. The 2021 study by Tusharbhai et al. was a randomized controlled clinical trial that looked at how well the kinesio tape could reduce complications like swelling, trismus, and pain after removing the third molar under general anesthesia under antibiotic coverage and paracetamol was used as analgesic [6]. Systematic reviews and meta-analyses by Aleksandra Jaro et al. in and Yushan Wang et al. in

2021 affirm the efficacy of Kinesio tape in significantly reducing postoperative swelling, pain, and trismus [5,8]. Danuta Lietz-Kijak et al. (2018), Oliver Ristow et al. (2013 and 2014), Kim et al. (2019), Golker et al.(2023) explored the application of kinesio tape in diverse oral and maxillofacial surgical scenarios, including mandible fractures, zygomatic maxillary complex fractures, cyst enucleation, and orthognathic surgery[5,9,10,11].All the studies mentioned above led to the understanding that the extra-oral application of kinesio tape has potential benefits and can reduce complications in terms of swelling, trismus, and pain post-surgery.

The observation that there were more female patients in the study by A.C.T. da Rocha Heras et al. in 2020 is consistent with our study [12]. Specifically, it was observed that male patients who refused to shave their beard were reluctant to participate in the study. Chiang et al. conducted a study with 80 patients who underwent third molar surgery under local anesthesia, in which the test group received only kinesiotaping post-surgery and all patients received antibiotics and analgesics [13]. In contrast, Tusharbhai et al. conducted a study comprising 30 patients for whom kinesio tape was applied in the classic traditional method in the study group, and patients received only paracetamol as an analgesic. However, both test group and control group patients in our study received antibiotics and analgesics with anti-inflammatory medication postoperatively [7].

The comparison studies conducted by Gozuluklu et al. and Yurttutan and Sunak et al. in 2019 and 2020, respectively, provide valuable insights into different techniques aimed at reducing postoperative swelling after surgeries. Gozuluklu et al. focused on comparing a classic traditional technique with a modified technique along with a masseteric support bandage, whereas Yurttutan and Sunak et al. introduced the "web strip" technique, applied horizontally to patients after surgery [14,15].Notably, our study extends this line of research by introducing a modified application of Kinesio tape, specifically using a "modified web strip technique" in a vertical direction from Line C (exocanthion-tragus) along the neck up to the supraclavicular region of the operated side.Many authors reported different times for removing kinesio tape. Yurttutan and Sunak et al.kept the tape for seven days. Gozuluklu et al., A.C.T. da Rocha Heras et al., Ristow et al., and Tusharbhai et al. taped patients for 5 days after surgery, whereas Genc et al. taped patients for only 2 days [3].

The 2019 study by Delemi ZH et al. compared the effectiveness of kinesio tape and oral NSAID tablets in a clinical trial with 30 patients. They found oral NSAID tablets worked better than kinesio tape [16]. In 2020, the same research authors reported that kinesio tape reduces edema and pain, which was almost identical to intraoral submucosal administration of dexamethasone injections given postoperatively, statistically, but clinically, dexamethasone injection showed better results in both parameters, as noted by our study [17]. The 2023 trial by Patil et al and B.Alhourani et al (2025) suggested the superior effects of Kinesio taping on post-operative complications and reduces the quantity of analgesic medications after mandibular third molar surgery respectively [18,19].

The outcomes of our study suggest that kinesiotaping along with NSAIDs have significant effect in reducing postoperative complications following third molar surgery. However, when compared to intravenous (IV) steroids, Kinesio Taping showed inferior effects. It was observed that intravenous steroids have a distinct advantage in mitigating inflammatory pain when compared to the application of Kinesio tape. This difference in efficacy is attributed to the production of vasoactive compounds, such as leukotrienes and prostaglandins, by intravenous steroids. These chemicals are vital for inhibiting phospholipase-A2 and releasing arachidonic acid after surgery. This helps reduce inflammatory pain more effectively. Furthermore, our study revealed that the administration of IV steroids before surgery resulted in a significant reduction in trismus compared to the use of Kinesio tape on postoperative days 3 and 7. This finding underscores the superior impact of intravenous steroids in limiting the development of trismus, a notable outcome that may be attributed to their systemic anti-inflammatory effects. Further study in larger sample size may be required to prove it.

Limitations:

The effectiveness of Kinesio tape could not be adequately assessed in male patients due to their unwillingness to shave their facial hair before surgery.

Conclusion:

Our study findings indicate that Kinesio tape, when used alongside anti-inflammatory medications, offers a non-invasive approach to reduce postoperative complications such as pain, edema, and restricted mouth opening. However, its effects are less pronounced when compared to intravenous (IV) steroids. Kinesio Taping cannot be considered as an independent treatment option for reducing post-operative sequelae due to limited evidence-based studies but it can be used as an adjunct option to improve the treatment outcomes for various conditions associated with maxillofacial surgeries.

Conflicts of Interest: None

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