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Effectiveness of Skin Traction in Reducing Pain in Patient with Hip Fracture

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ABSTRACT

Introduction: Hip fractures are a significant public health issue due to high morbidity and mortality rates. Skin traction is commonly used in the preoperative management of hip fractures to stabilize the fracture site, reduce muscle spasms, and alleviate pain. This study evaluates the effectiveness of skin traction in reducing pain, its impact on analgesic use, and associated adverse effects. **Materials and Methods:** A qualitative study was conducted among 100 patients with hip fractures in orthopedic wards of tertiary care hospitals. Pain levels were assessed before and after traction using a numerical rating scale, while analgesic requirements were recorded. The study employed thematic analysis for qualitative data, identifying key patterns and themes related to pain management. Descriptive statistics were used to analyze numerical data, providing insights into pain reduction and analgesic use. This approach allowed for a comprehensive evaluation of patient experiences, enhancing understanding of traction's effectiveness in pain management for hip fractures in a clinical setting. **Results:** Skin traction significantly reduced pain levels by 54.1% over 48 hours. The need for opioid analgesics decreased by 43.8% and NSAID use by 23.1%. Adverse effects included skin irritation (12%), pressure sores (5%), and neurovascular issues (3%), with 80% reporting no complications. **Conclusion:** Skin traction effectively reduces pain and analgesic requirements in patients with hip fractures. Regular monitoring is essential to mitigate potential adverse effects and optimize outcomes.

INTRODUCTION

The high death and illness rates associated with hip fractures establishes them as a major public health problem (Tosun et al., 2018). Research by Cooper et al. (2011) indicates that hip fracture incidence reached 1.6 million worldwide during 2000 but projections show this will surge to 6.3 million cases by 2050 because of population aging and increased life expectancy. Research from the National Clinical Guideline Centre (2011) demonstrates that hip fracture deaths rise to 10% during the first 30 days following the injury and surpass 30% during annually post-injury. The permanent condition secondary to hip fractures creates major life quality deterioration (Tosun et al., 2018). Findings show that older individuals must settle into long-term care facilities after their hip fracture in about 25% of all cases (Biz et al., 2019).

Hip fractures affecting the proximal femur are divided into two categories: The operational definition consists of extracapsular elements with intertrochanteric and subtrochanteric variations alongside intracapsular characteristics of femoral-head and neck anatomy (Tosun et al., 2018). By applying Pauwels' classification scheme doctors can distribute femur fractures into categories based on their biomechanical stress patterns. Displacement injuries can get graded through this system by determining the angle difference between the fracture line in the distal region and the horizontal reference. Type I fractures with angles less than 30° are generally caused by compression. Type II fractures between 30 and 50 degrees exhibit shearing pressure that threatens bone healing. Fracture displacement becomes more probable in type III fractures which combine shearing forces with

a varus force at an angle greater than 50° (Shen et al., 2016). Predominant pain affects comfort levels of people with hip fractures because bone displacement alongside movement at the fracture site adds to their discomfort. Moving the fragmented bones increases post-surgical difficulty in reduction along with an elevated risk of avascular necrosis and nerve damage and reduced bone fusion according to Tosun et al. (2018). All medical opinions agree patients with hip fractures need immediate surgery for hazard minimization according to Tosun et al. (2018). Multiple guidelines (Endo et al., 2013; Kobayashi et al., 2020; The National Hip Fracture Database, 2021) agree that surgical intervention must happen on admission day or the following day. Someone's surgery date for hip fracture treatment should be established as soon as possible unless acute or pre-existing medical conditions demand stability before operations (Tosun et al., 2018). Long surgical waiting times for trauma cases are attributed to administrative constraints by Endo et al. (2013) and Tosun et al. (2018). The National Hip Fracture Database published results of a yearly UK trauma center audit showing surgery intervals exceeding one or two days for 32% of patients in 2019 (The National Hip Fracture Database, 2021). Responses to scaphoid fractures commonly use skin traction together with pain relief medication for both position management and pain reduction (Endo et al., 2013; Tosun et al., 2018). A foam stirrup serving as a traction point is wrapped below the thigh while securing around the heel of the foot. After positioning the foot into a figure-of-eight shape the bandaging begins at the ankle before continuing up to the upper part of the leg. To generate traction a weight-bearing cable runs across a pulley and connects to the foam stirrup (The Royal Children's Hospital Melbourne, 2019).

The objectives of splints include active muscle spasm reduction and controller actuation with rest and realignment of bones and a raised bed end for countertraction that decreases edema (Biz et al., 2019; Duperouzel et al., 2018; Endo et al., 2013). Little evidence has been gathered about the benefits and disease risks associated with exterior operate splint use although it continues to be controversial (Kobayashi et al., 2020). While pharmacologic means like opioids and NSAIDs are usually administered to control pain, these medicines are often associated with side effects, which include respiratory depression, gastrointestinal upset, and a prospect for dependency (Abou-Setta et al., 2011). Therefore, non-pharmacological modalities for the management of fractures have been advocated to include skin traction to relieve pain. Pain is one of the worst aspects of hip fractures as it limits mobility, predisposes to complications, delays rehabilitation, and increases the risk of such complications as pressure sores, deep vein thrombosis, and pulmonary infections (Gordon et al., 2017). One familiar mechanical intervention is skin traction, in which adhesive or non-adhesive skin sensors are attached to weights creating a pulling force. This one aims at reducing pain because, by stabilizing the fracture site, promoting appropriate alignment of the fractured bone, and reducing muscular spasms, this therapy works to decrease pain (Gordon et al., 2017). The effectiveness of skin traction in the minimization of pain, although it has been widely used is still under debate. As stated by some studies, skin traction seems to minimize pain and the use of pain-relieving medicines considerably (Bachrach-Lindström, L., & Arne, 2018). While some scholars have endorsed its use, others have doubted its effectiveness suggesting that more information is required to support the theoretical application of the model (Doherty et al., 2019). This study aims to evaluate the effectiveness of skin traction in reducing pain among patients with hip fractures. By analyzing its impact on pain levels, opioid consumption, and patient satisfaction, this research seeks to contribute to evidence-based guidelines for pain management in hip fracture patients.

LITERATURE REVIEW

Skin traction can be categorized as one of the conventional approaches to hip fracture preoperative interventions. This literature analysis considers the extent to which skin traction can reduce hip fracture patients' pain and whether other pain interventions are more effective. Fragility fracture of the hip is a major problem in the community, affecting mainly the elderly and is mostly accompanied by morbidity and pain. Managing a patient's pain is crucial to enhancing patient outcomes and early mobilization.

Older people have most hip fractures secondary to osteoporosis or falls, but vigorous activities can get young individuals also. A hip fracture instantly leads to severe pain and the following complications include immobility, pressure, ulcer formation, and thrombosis (Parker et al., 2018). Thus, keeping in mind how effective pain management also enhances patient comfort, this innovation can also lead to decreasing stress-induced physiological responses that can hinder healing (O'Hara et al., 2019).

Mechanism and Application of Skin Traction

Skin traction is the process of applying weights and adhesive materials and thus pulling the affectionate skin of the affected limb with force. The major goals are achieved by restoring and stabilizing the normal position of the fractured bone and reducing muscle contractions to alleviate pain. While skin traction is widely used, whether it offers conspicuous pain relief, as expected, remains questionable among doctors.

Systematic Reviews and Meta-Analyses

In a systematic review including five RCTs, adverse reactions to skin traction were compared with standard care without traction by Sammut et al. (2021) to

determine the efficacy of the treatment in reducing pain and analgesic consumption; there was not much difference in the results. The authors pointed out major flaws and limitations of the available information and advocated for better investigations to make definitive conclusions, Too limited evidence was used in the study by Handoll et al. (2011) in a Cochrane review on the effectiveness of preoperative traction in patients with hip fractures. In the end, the data from a few RCTs resulted in the review's finding that there was poor evidence about the effectiveness of skin traction for pain that could warrant its routine use. The findings showed that although skin traction was utilized the pain reduction and the amount of analgesics needed did not demonstrate a better outcome than no traction at all.

Randomized Controlled Trials

Saygi et al. (2010) conducted a randomized controlled experiment with 108 patients with hip fractures and randomized the patients into three groups. Regarding the comparison between skin traction with weights and skin traction without weights, sixteen patients were included in the former group, and twenty-four patients in the latter group. Regarding the use of a pillow to support the limbs, thirty patients received such treatment. The research also reveals that simple placement may be as effective as or even superior to skin traction in addressing pre-operative discomfort since the groups who used the pillows reported lesser pain as compared to the two skin traction groups.

Other recent work includes an RCT by Rosen et al. (2001) that involved 100 patients comparing skin traction with cushion placement. On the same, the study revealed that the group, which had no traction, benefited immensely in the reduction of acute pain as compared to the other team. However, patients who underwent skin traction and those who had higher baseline pain scores displayed modestly more pain decrease; thus, skin traction efficiency may be moderate and depend upon base pain levels.

Observational Studies

Anderson et al. (1993) in an observational study selected 252 patients with distinctive proximal femur fractures. As reported in the study, the occurrence of pressure ulcers, the use of analgesics, and pain severity were similar in patients who had skin traction as well as those who had no skin traction. These results also accrue more worries about the effectiveness of skin traction in managing the pain of hip fracture patients.

Alternative Pain Management Strategies

Other approaches to managing pain have been explored because skin traction is unconvincing. When applied to hip-fractured subjects, small evidence has revealed that nerve blocks, particularly fascia iliaca compartment blocks, reduced the onset of delirium and acute pain. When compared to traditional approaches such as skin traction, nerve blocks are an excellent option, as Guay et al. discovered in their extensive research (2017).

Potential Complications of Skin Traction

In most cases skin traction is considered a risk-free measure, however there is always a possibility of complications. Some of the challenges reported include pressure ulcers such as pressure sores, skin breakdown and neurovascular compromise. These risks coupled with the questionable efficacy of ST in mobilizing skin stretch for the purpose of pain relief make the consistent use of skin traction in clinical practice questionable.

Clinical Guidelines

Data available today used in the development of current clinical practice protocols suggest ambiguity concerning skin traction efficacy. For example, the nursing practice standards of the Royal Children's Hospital report the utilisation of skin traction as one of the approaches to managing femoral fractures but also recommend systematic evaluation of the effectiveness of skin traction in treating patients on a case-by-case basis. According to the guidelines, other methods of managing the pain should be considered due to the complications related to skin traction.

Research Objective

The purpose of this work is to analyze the outcomes of skin traction in pain management for patients with hip fractures. More specifically, the study objectives are to determine the amount of pain relief skin traction achieves, to establish its superiority or inferiority to other methods of pain relief, and to measure the effect of skin traction on the need for additional analgesics and on patient comfort. Further, the study aims to establish the adverse effects that may be caused by skin traction and present the information to help clinicians maximize the preoperative management of hip fracture sufferers. The findings of this study will help enhance the standard practices related to pain management in major orthopedic and trauma clients.

MATERIALS AND METHODS

This is qualitative research, in which the assessment of skin traction in patients with hip fractures, 100 subjects were included to alleviate the pain. Samples were purposively recruited from orthopedic wards of tertiary care hospitals. Eligible participants were those who were aged greater than or equal to 18 years, with true hip fractures, unable to undergo traction or suffer severe cognitive deficits. Patient-reported pain measured self-rates on a numerical rating scale from 0-10 and satisfaction with pain management was done through interviews as well as observations from the wards. The VAS pain scores were recorded 48 hours before and after the application of traction and the patient's ability to move around, the amount of analgesia given, and any side effects. Qualitative data were analyzed through

thematic analysis while quantitative data through descriptive analysis in this study. To fulfil the research ethical procedures, ethical clearance was sought, and participants' consent was obtained.

RESULTS

Table 1

Patients Gender

Gender		
Male	42	42%
female	58	58%

Table 1 highlights the gender distribution of the study participants, with 42% being male (n=42) and 58% female (n=58). This reflects the higher prevalence of hip fractures among females, likely due to osteoporosis being more common in postmenopausal women.

Table 2

Type of Hip Fracture

Variable	N	Percentage (%)
Intracapsular	55	55%
Extracapsular	45	45%

Table 2 categorizes the fractures into intracapsular (55%, n=55) and extracapsular (45%, n=45) types. Intracapsular fractures were slightly more prevalent, aligning with findings that such fractures are common in older adults due to reduced bone density and minor traumas.

Table 3

Pre-existing Conditions of patients

Variable	N	Percentage (%)
Hypertension	30	30%
Diabetes	22	22%
Osteoporosis:	18	18%

Figure 1

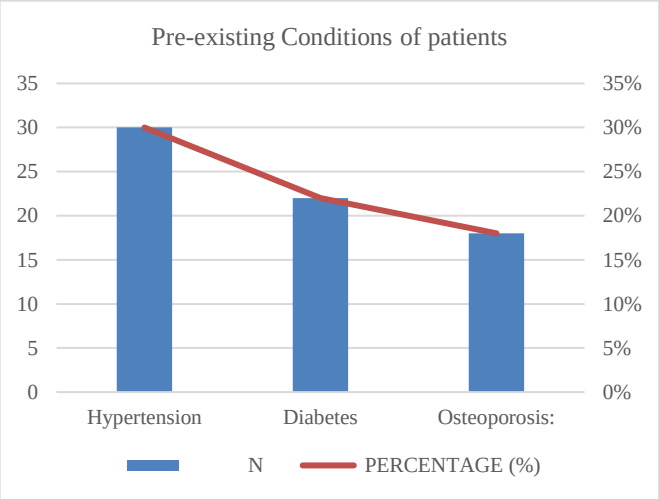


Table 3 lists the participants' pre-existing conditions: 18% (n=18) had osteoporosis, 22% (n=22) had diabetes, and 30% (n=30) had hypertension. These comorbidities are important because they may affect how patients with hip fractures perceive pain, how quickly they heal, and how well they are managed overall.

Table 4

Pain Scores Pre- and Post-Traction

Time Point	Mean Pain Score (±SD)	Range (0-10)
Pre-traction (Baseline)	8.5 ± 1.2	7-10
Post-traction (24 hours)	5.2 ± 1.6	3-9
Post-traction (48 hours)	3.9 ± 1.4	2-7
Pain Reduction (%)	-	54.1%

After applying skin traction, pain scores significantly decreased, as seen in Table 4. A 54.1% decrease in pain was indicated by the mean pain score, which dropped from 8.5 ± 1.2 at baseline to 5.2 ± 1.6 at 24 and then to 3.9 ± 1.4 after 48 hours. This implies that skin traction works well to reduce muscular spasms and stabilize the fracture site, which eventually reduces pain.

Table 5

Analgesic Requirements Before and After Traction

Parameter	Pre-Traction (N)	Post-Traction (N)	Reduction (%)
Opioid Analgesics	80	45	43.8%
NSAIDs	65	50	23.1%

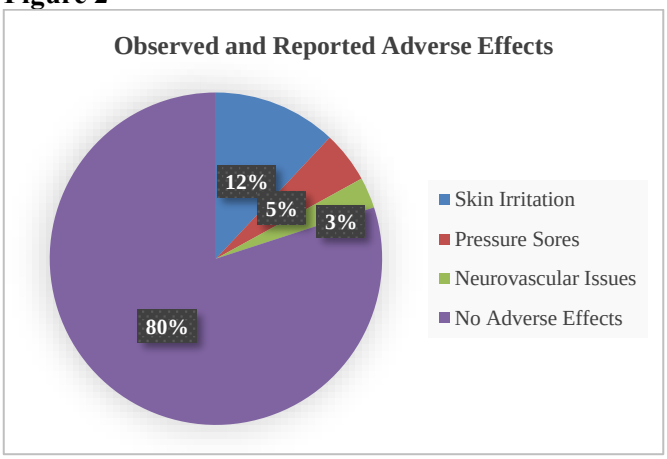
Following the application of skin traction, there was a significant decrease in the need for analgesics (Table 5). The use of opioid analgesics decreased from 80% pre-traction to 45% post-traction, a 43.8% reduction, and the use of NSAIDs decreased by 23.1% (from 65% to 50%). These results demonstrate the potential of skin traction as a complementary non-pharmacological intervention to lessen reliance on analgesics and the side effects that come with them.

Table 6

Observed and Reported Adverse Effects

Adverse Effect	Frequency (N)	Percentage (%)
Skin Irritation	12	12%
Pressure Sores	5	5%
Neurovascular Issues	3	3%
No Adverse Effects	80	80%

Figure 2



The observed and reported negative effects are described in table 6. The safety of skin traction was highlighted by

the fact that most patients (80%, n=80) had no negative side effects. However, a few side effects were noted, such as neurovascular problems (3%, n=3), pressure sores (5%, n=5), and skin irritation (12%, n=12). These results highlight how crucial it is to keep a tight eye on patients while they are undergoing skin traction to prevent any problems.

DISCUSSION OF RESULTS

These findings illustrate how skin traction reduces pain in patients with hip fractures and the implications on safety and analgesic requirements. Pain scores revealed that there was a significant reduction in hip fracture pain after the application of traction within 48 hours. At 48 hours, the mean pain score decreased from a baseline of 8.5 to 3.9, representing a per cent reduction of 54.1%. This goes a long way in explaining that skin traction can be applied for the management of acute pain since it is instrumental in the stabilization of the site of a fracture as well as the intervention of spasms. This kind of pain management is required to enhance the organization of preoperative procedures and patient satisfaction, as well as can maybe augment the results of surgery.

Consequently, the patient required less analgesics, after skin traction had been applied to the patient. In terms of quantity, NSAID use fell by 23.1 per cent and opioids by 43.8 per cent. These outcomes suggest that skin traction can minimize the reliance on opioids and NSAIDs because skin traction is an effective complementary method to drug interventions for pain. This is particularly beneficial to the possible risks and side effects of these drugs, such as respiratory depression, gastrointestinal problems as well as physical dependence. The reduced need for analgesics is also in line with previous studies that have proposed that, for hip-fractured patients, nonpharmacological approaches could be combined with classical pharmacological pain management strategies.

The research also provides some insight into skin traction's risk factors. Concerning the practical implementation of the intervention, the findings revealed that 80 % of the participants experienced no adverse impact. However, some complications were observed; pressure ulcers, 5% skin reactions 12% and neurovascular complications, 3%. These outcomes of the findings underscore how important it is to avoid dangers and give maximum protection to the patient through careful observation during skin traction. Thus, to avoid these possible problems, preventive measures should be taken. Such ones include skin check-ups and changes in traction methods.

Notably, the results might have been influenced by the clinical and demographic characteristics of the participants; these included the difference in hip fractures among women and men and the presence of other diseases including osteoporosis diabetes and hypertension. A somewhat higher ratio of intracapsular fractures may help explain differences between participants regarding pain and need for care. All things considered, the study supports the effectiveness of skin traction as a preoperative pain control technique for patients with hip fractures, but an added note is made on these elements which underlines the fact that such patients require specific treatment packages owing to the nature of their problem as indicated in the research. Skin traction might be among the non-pharmacologic approaches which help to enhance the results of the therapy significantly and decrease the levels of pain and the amount of necessary analgesics. In future studies to enhance pain treatment the effects of skin traction should be compared with other therapies such as nerve blocks.

CONCLUSION

The result of the study indicates that skin traction as an effective technique of non-pharmacological approach in the management of pain among hip fracture patients has adequate support from the data analyzed. That is why pain management was assessed by a mean decrease in pain scores (54.1%) together with a decrease in opioid and NSAID analgesic dependency. Since the majority of the patients recorded no negative side effects out of 80% this was equally a confirmation of how safe the technique is when supervised properly. The following minor complications were recorded; dermatitis, pressure ulcers and neurovascular issues; complained by some of the patients notwithstanding, pointing to the need for close monitoring during traction application. The findings contribute to the stock of knowledge by proving skin traction efficient in preoperative care and offering an alternative to pharmaceutical control of pain alone. Not only does stabilization of fractures and reduction of issues like muscular spasms provide comfort to the patient, but this method may have potential benefits regarding improved surgery outcomes. Skin traction seems to show advantages; however, further studies are necessary to compare skin traction with other analgesic pain modulation methods, such as nerve blocks, as the benefits might depend on the patient's age and the type of fracture they underwent. As for the clinical recommendation, future studies should seek long-term consequences and the correct duration for the skin traction application. Last of all, incorporating skin traction within hip-fractured patients' basic preoperative management plan could optimize pain control, reduce analgesic use, and enhance general patient care.

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