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RESEARCH ARTICLE
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A STUDY ON COMPLICATIONS SEEN IN MUSCULOSKELETAL INJURIES TREATED BY TRADITIONAL BONE SETTERS

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Abstract
Traditional bone setters (TBS) remain a common source of care for musculoskeletal injuries in rural and semi-urban parts of India, despite lacking formal medical training and standardized techniques. This study aimed to evaluate the types and frequencies of complications arising from injuries initially managed by TBS and to explore the socio-demographic characteristics and motivations of the affected patients. Conducted as a cross-sectional observational study at a tertiary care hospital in Karnataka , the research included 49 patients who presented with complications following TBS intervention. Data were collected using a structured clinical proforma and analyzed for injury patterns, anatomical sites involved, types of complications, reasons for TBS patronage, and definitive treatment modalities employed upon hospital admission. The findings revealed that malunion was the most common complication (36.7%), followed by delayed union (12.2%), nonunion (10.2%), and neglected dislocations (10.2%). Additional complications such as compartment syndrome, chronic osteomyelitis, joint stiffness, and soft tissue infections were also documented. Fear of surgery (28.57%) and affordability (22.4%) were the leading reasons for choosing traditional care, often compounded by limited education and economic hardship. The study concludes that complications resulting from TBS practices are largely preventable and impose a significant burden on tertiary care resources. Public health efforts must prioritize awareness, early orthopedic referral, and structured collaboration with TBS practitioners. Integrating community health workers and culturally sensitive education can improve outcomes and reduce morbidity associated with traditional fracture care.

Keywords: Traditional bone setters, fracture complications, musculoskeletal injury, rural healthcare, malunion.

1. Introduction

In many low- and middle-income countries, especially in rural areas with few formal orthopaedic services, TBS are often called upon for traditional bone setting. Patients living in underserved Indian communities very often choose TBS for the treatment of musculoskeletal injuries because of trust, lower cost, and close accessibility. Despite the presence of modern healthcare, this traditional practice is still common, since people often learn it within their family without formal medical study.

According to the World Health Organization, traditional medicine is a main source of basic healthcare for up to 80% of the population across some developing countries. This means that TBS is designed to fit the culture, easing management of traumatic and injured patients by offering care that people recognize and feel comfortable with (Burford et al., 2007). Still, because they have no proper anatomical knowledge, aseptic practices, or standard rules for treating patients, surgeries become very risky for patients. Many cases from Nigeria, Pakistan, Ghana, and Ethiopia demonstrate that severe complications, including gangrene, nonunion, malunion, severe bone infection, and permanent disability, are common after traditional bone setting (Dada et al., 2009; Alam et al., 2016; Edusei et al., 2015; Kumma et al., 2013).

Traditionally, not overseeing orthopaedic care has often led to terrible consequences. In cases of excessive splint tightening, the use of herbal poultices and late reduction of broken bones, vascular issues, and loss of a limb have been noted (Machaku et al., 2025; Soomro et al., 2018). It is common in such regions for the community to seek traditional healers first, as they are known and close to people and often refer them to orthopaedic care next (Card et al., 2020).

Even though reports in certain regions have noted some problems with TBS interventions, major information is still not widely available. Several investigations have examined the types of earlier treatment complications, though most have not used the same methods and are limited by geography. Garikapati et al. (2023) pointed out that wider monitoring and attention to location-specific points are needed to accurately estimate how big this issue is.

On the other hand, Onyemaechi et al. (2021) found that, despite their frequent occurrence in the clinic, these TBS complications are seldom discussed in scholarly publications, so policies rarely pay attention to them. Many of these reports deal with single groups or communities, yet do not add hospital-based clinical data into the analysis. Because of this, evidence that can be scaled up to inform actions or policies is lacking. Previously conducted studies in South Asia and sub-Saharan Africa mostly diagnose malunion, nonunion, infection, and gangrene in fracture patients (Memon et al., 2009; Ekere & Echem, 2011; Esin et al., 2020), yet are not as clear on how or when they received treatment. In addition, not many have explored how secondary corrections and extra therapy can negatively impact a patient and affect health policy. Because many injuries worsen following common bone-setting methods in rural India, more information is urgently needed about the consequences and extent of these complications. Through this research, we try to link existing information by studying patients who first received TBS therapy and later needed the support of an orthopaedic doctor because of side effects or worsening health problems.

This paper shows the main kinds of wounds handled using conventional interventions, the time spent delaying medical help, and the subsequent complications, revealing what is often a neglected but closely related issue in healthcare. The study results will allow doctors to prepare for challenging cases and assist community health officials in planning supportive education programs.

Studying this topic at the hospital level and comparing findings with those from around the world can play a role in further discussions on how to mix traditional and modern approaches to healthcare. According to Nwachukwu et al. (2011), understanding history, culture, and clinical aspects of bone setting is necessary for smoothly transitioning to healthcare models that emphasize patient safety.

Overall, this study addresses a pressing issue in public health and supplies facts that may adjust approaches to both preventive support and emergency treatment policies.

2. Materials and Methods

2.1 Study Design and Setting

The study was performed as an observational, cross-sectional study in the Department of Orthopaedics at BGS Global Institute of Medical Sciences (BGS GIMS) in Bengaluru, India. The hospital is set up as a tertiary care center to meet the healthcare needs of multiple populations from urban settings, nearby towns, and the countryside near Bengaluru. The research was conducted from July 2022 to January 2024, and during this time, patients with musculoskeletal issues who saw TBS for the first time and later developed complications were recruited for thorough examination.

Since this tertiary center was chosen, it allowed for treating many patients and using advanced tools for both diagnosis and treatment of problems resulting from traditional bone-setting methods.

2.2 Population and Sampling

The study population comprised patients presenting with complications following treatment of upper or lower limb fractures and dislocations by traditional bone setters. A total of 49 patients were included in the study. The sample size was derived based on existing literature indicating a 40% prevalence of malunion following TBS intervention. Using an absolute precision of 14%, the minimum sample size was estimated at 49 patients, providing sufficient statistical power to explore the study's objectives.

A systematic random sampling technique was applied to reduce bias. Patients were enrolled consecutively based on their fulfillment of the inclusion criteria, with every eligible patient presenting to the orthopaedic department during the study period being considered for inclusion.

2.3 Inclusion and Exclusion Criteria

To ensure clinical relevance and isolate TBS-related complications, the following eligibility criteria were used:

Inclusion Criteria

- Patients of any age and gender presenting to the orthopaedics department with upper or lower limb fractures or dislocations.
- A documented history of prior treatment by a traditional bone setter, regardless of geographic location.
- Ability to give informed consent and participate in follow-up evaluation.

Exclusion Criteria

- Patients who initially presented directly to BGS GIMS without undergoing any traditional intervention.
- Injuries involving the head, chest, abdomen, or spine, due to the complexity and the confounding nature of such trauma.
- Patients with an unclear history of TBS treatment or those unwilling to participate.

These criteria were aimed at isolating the musculoskeletal complications attributable solely to traditional bone-setting practices, thereby eliminating confounding variables.

2.4 Data Collection Methods

A pre-validated, semi-structured clinical proforma was used to collect comprehensive patient data. This proforma was developed by the principal investigator and approved by the institutional review board. It consisted of several segments, each targeting specific areas relevant to the study:

Demographic Information:

- Age, gender, occupation, educational qualification, socioeconomic status, and geographical background.

Clinical and Injury Details:
- Type of injury (fracture/dislocation).
- Mechanism of trauma (e.g., fall, road traffic accident).
- Anatomical site of injury (e.g., humerus, femur, tibia).
- Date of injury and the time lag between TBS treatment and hospital presentation.

Details of Traditional Bone Setter Intervention:
- Materials used (e.g., bamboo sticks, herbal pastes, tight bandages).
- Number of visits and follow-ups at the TBS center.
- Type of splints, manipulation techniques, and any indigenous oils or compresses applied.
- Reasons for choosing TBS (fear of surgery, affordability, cultural belief, previous success, superstition).

Clinical Examination and Diagnostic Workup:
All patients were subjected to detailed physical examination, including:
- Inspection for deformities, sinuses, and ulcers.
- Palpation for tenderness, swelling, crepitus.
- Range of motion assessment.
- Local vascular and neurological status.

Radiological investigations (primarily X-rays) were used to confirm malunion, nonunion, delayed union, joint incongruity, or osteomyelitis. Additional investigations, such as blood tests and wound cultures, were performed where infection was suspected.

2.5 Ethical Considerations
The Institutional Ethics Committee of BGS Global Institute of Medical Sciences approved the ethical clearance for the study before recruiting any patients. Everyone in the study was given an information sheet explaining what the study is about and its risks.

Before we began our research, each individual involved gave written informed consent in either English or Kannada. Parents or guardians consented for their children to take part. All data was kept confidential, and no one's participation affected the type of medical care they received. The study explained that anyone taking part could choose to withdraw at any time, without this affecting their care.

2.6 Statistical Analysis
The data were entered and organized with Microsoft Excel, and statistical analysis was done with SPSS version 22.0, R statistical environment, and MedCalc software. In the analysis, frequencies and percentages for complication types and gender were presented using descriptive statistics. Age and day of hospital stay were estimated along with their standard deviation. Providing a graphical visualization of data by means of bar charts, pie charts, and line graphs, to confirm and explain the results (e.g., how many TBS patients belong to each age group, their main motivations, and the types of injuries). In addition, Chi-square testing was set up to look for associations between the types of injury and different complications, even though the main study design didn't rely on inferential statistics.

In some cases, a p-value less than 0.05 was considered statistically significant. However, being a descriptive study, hypothesis testing became less prominent.

3. Results
3.1 Demographic Characteristics of the Study Population
The present study analyzed 49 patients who reported complications following musculoskeletal injury management by traditional bone setters. The age distribution showed a concentration of cases among

middle-aged adults, with the 41–50 and 51–60-year age groups each accounting for 20% of the total patients. This was followed by the 31–40-year group (18%), while the elderly groups—61–70 and 71–80 years—each contributed 12% of cases. The younger cohorts were less represented, with only 2% in the 0–10 age group, 6% in the 11–20, and 4% in the 21–30, indicating that complications were more common among the economically active and physically mobile adult population. A marked gender disparity was also observed, with 73.5% of patients being male (n=36) and 26.5% female (n=13), reflecting sociocultural and occupational patterns where men are more frequently engaged in labour-intensive or high-risk activities. This demographic distribution is detailed in Table 1.

Table 1: Age-wise Distribution of Patients with Complications Following Treatment by Traditional Bone Setters

Age Group	Number of Patients	Percentage (%)
0–10	1	2%
11–20	3	6%
21–30	2	4%
31–40	9	18%
41–50	10	20%
51–60	10	20%
61–70	6	12%
71–80	6	12%
81–90	3	6%
Total	49	

3.2 Nature and Distribution of Injuries

Injury patterns among the study cohort predominantly involved fractures of long bones, accounting for the overwhelming majority of cases. The most frequently affected anatomical site was the radius and ulna, involved in 38.7% of the patients.

This was followed by miscellaneous fractures, such as those involving small bones or multiple injury sites, which accounted for 16.32%, and femoral fractures at 14.28%. Humerus fractures were seen in 10.2% of the patients, while tibial involvement was recorded in 4.08%. In addition to fractures, joint dislocations accounted for 10.2% of injuries, and soft tissue injuries made up 6.12% of the cases. These distributions reflect the typical injury mechanisms in rural and semi-urban populations, where falls, blunt trauma, and road traffic incidents are predominant. The anatomical breakdown is detailed in Table 2 and visualized in Figure 1.

Table 2. Anatomical Site of Injury

Pathology	Number of Patients	Percentage (%)
Fracture - Femur	7	14.28%
Fracture - Tibia	2	4.08%
Fracture - Humerus	5	10.20%
Fracture - Radius/Ulna	19	38.70%
Fracture - Misc	8	16.32%
Dislocation	5	10.20%
Soft Tissue Injury	3	6.12%
Total	**49**	

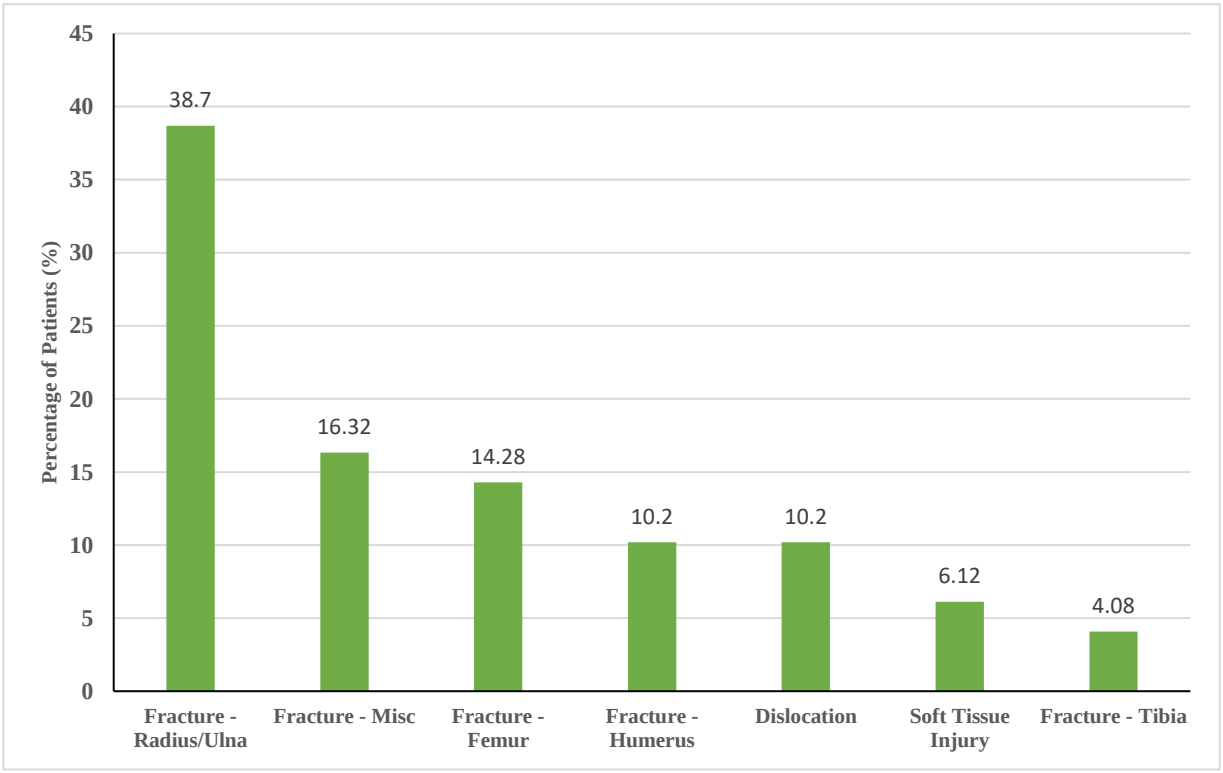

Figure 1. Bar Chart Showing Frequency of Bone Involvement

3.3 Clinical Complications Resulting from TBS Intervention

A broad spectrum of complications was observed among patients who received initial treatment from traditional bone setters. The most frequent complication was malunion, reported in 36.7% of patients. These cases are often presented with angular deformities, limb shortening, and functional impairment, primarily due to the absence of proper anatomical alignment and inappropriate splinting techniques. Delayed union occurred in 12.2% of patients, while nonunion was identified in 10.2%, both conditions requiring secondary surgical correction. Neglected dislocations were also seen in 10.2% of the cases, where joints remained unreduced for prolonged periods. Additional complications included joint stiffness (6.12%), complex regional pain syndrome (CRPS) (4.08%), and compartment syndrome (4.08%), the latter posing immediate vascular and neurological threats. Singular instances of Volkmann's ischemic contracture, chronic osteomyelitis, septic arthritis, cellulitis, and joint instability were also recorded, each contributing 2% to the complication profile. These findings underscore the multifaceted risks associated with traditional bone setting and the critical importance of timely orthopaedic intervention. A comprehensive summary of complications is presented in Table 3, with a graphical representation in Figure 2.

Table 3: Type and Frequency of Complications Due to TBS Treatment

Complication	Number of Patients	Percentage (%)
Malunion	18	36.7%
Delayed union	6	12.2%
Non union	5	10.2%
Neglected dislocation	5	10.2%
Joint stiffness	3	6.12%
Compartment syndrome	2	4.08%
CRPS	2	4.08%
Volkmann's Ischemic contracture	1	2%

Chronic osteomyelitis	1	2%
Cellulitis	1	2%
Septic arthritis	1	2%
Joint instability	1	2%
Total	49	100%

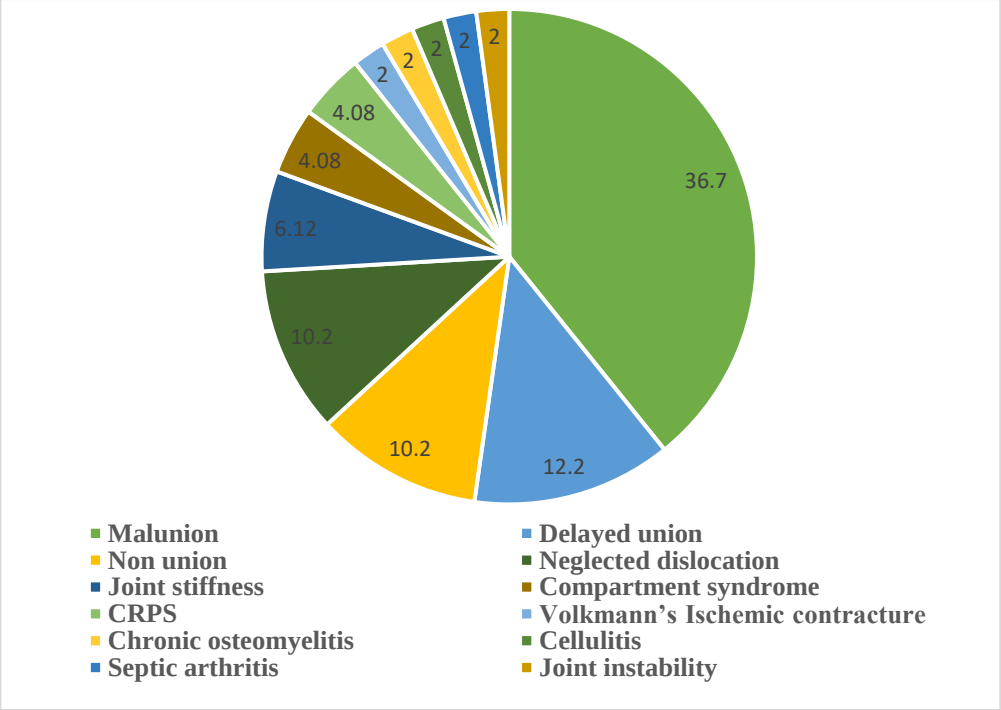

Figure 2. Pie Chart Showing Distribution of Complications

3.4 Delay in Seeking Formal Medical Attention

A notable trend among the patients was the significant delay between the initial injury and their presentation to the hospital. Most patients sought tertiary care between four to eight weeks after their injury, often after multiple ineffective or harmful visits to traditional practitioners. This delay was largely responsible for the progression from treatable fractures to complex, morbid complications (refer to **Figure 3**).

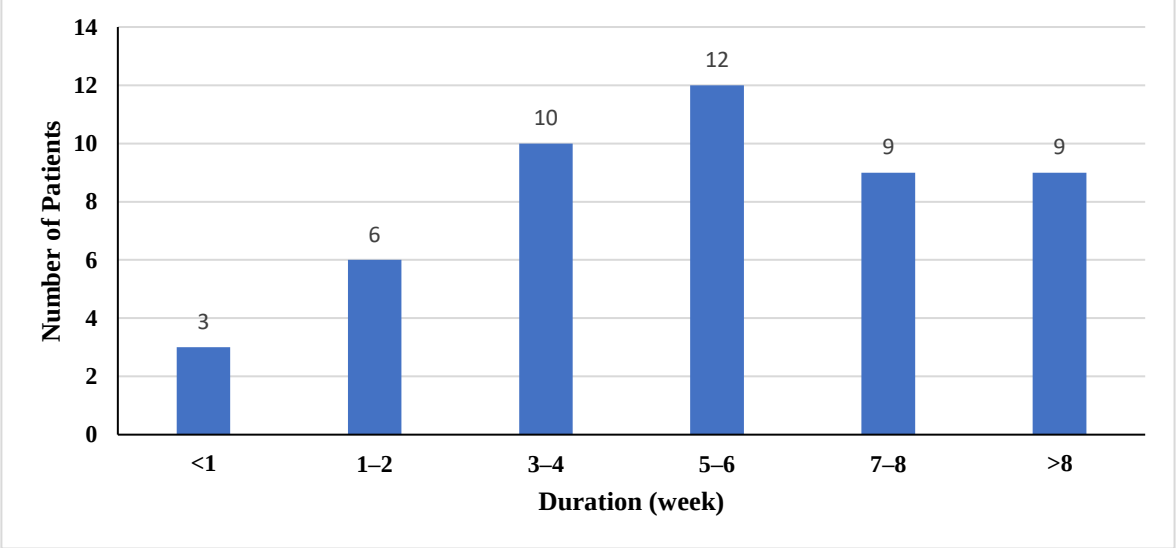

Figure 3. Duration of Delay Before Hospital Presentation (in weeks)

3.5 Socioeconomic and Educational Background of Patients

Analysis of the educational profile of the study population indicated that a substantial proportion of patients had limited formal education. Specifically, **32.65%** of patients had received education up to the 10th standard, while **18.36%** had not received any formal education, and another **18.36%** had studied up to the 12th standard. Only **30.61%** of patients had completed a degree or higher level of education.

These findings highlight that nearly **69.4%** of the patients had an educational level of 12th standard or below, suggesting that limited literacy may have played a role in delayed health-seeking behavior and reliance on traditional bone setters. This lack of awareness regarding the risks associated with unregulated treatment practices and the benefits of modern orthopaedic care likely contributed to the complications observed. The overall distribution of educational levels is summarized in Table 4.

Table 4: Educational Status of Patients

Education Level	Number of Patients	Percentage (%)
None	9	18.36%
Upto 10th	16	32.65%
Upto 12th	9	18.36%
Degree or above	15	30.61%
Total	49	100%

3.6 Factors Influencing the Choice of Traditional Bone Setters

Patients were also surveyed regarding their motivations for choosing traditional bone setters over institutional medical services. The most frequently cited reason was fear of surgery, reported by 28.57% of the respondents.

Affordability emerged as another major consideration, with 22.4% of patients indicating that the lower cost of traditional treatment influenced their decision. Ease of accessibility to bone setters within their local communities was cited by 10.2%, while lack of awareness about modern medical care was reported by 14.3% of respondents. Additional reasons included superstition (8.16%), fear of hospital admission (8.16%), and fear of amputation (8.16%), reflecting deep-rooted socio-cultural beliefs and apprehensions regarding conventional healthcare systems. These determinants are summarized in Table 5 and visually represented in Figure 4.

Table 5: Reasons for Choosing Traditional Bone Setters

Reason	Number of Patients	Percentage (%)
Easily accessible	5	10.2%
Affordability	11	22.4%
Fear of admission	4	8.16%
Fear of surgery	14	28.57%
Superstition	4	8.16%
Fear of amputation	4	8.16%
Lack of awareness	7	14.3%
Total	49	100%

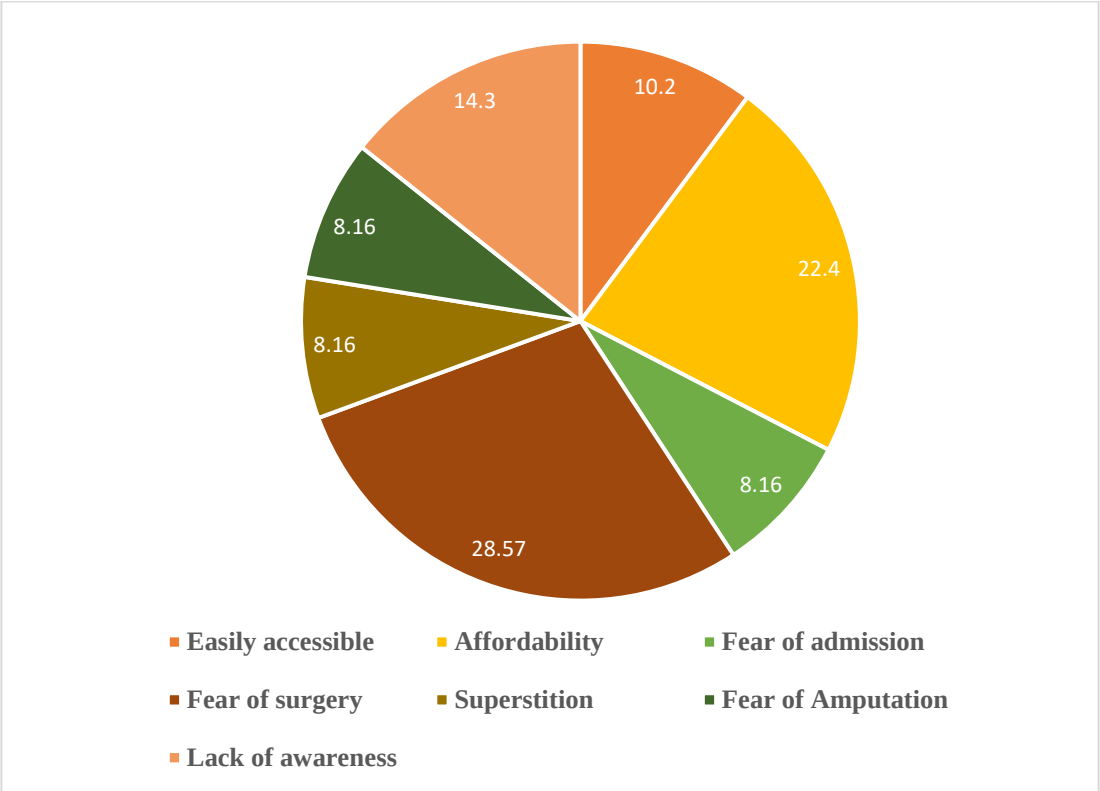

Figure 4. Bar Graph Showing Factors Influencing TBS Patronage

3.7 Treatment Modalities Provided at the Tertiary Hospital

Following admission to the orthopaedic department, patients underwent a range of diagnostic evaluations and therapeutic interventions based on the severity of complications. Surgical treatment was required in a substantial proportion of cases, including open reduction and internal fixation (ORIF) for malunions and nonunions, and debridement for infected wounds. Fasciotomies were performed in cases of suspected compartment syndrome, and amputation was undertaken in extreme cases involving gangrene. Non-surgical treatments, such as joint mobilization, physiotherapy and prolonged immobilization, were applied in milder cases. Hospital stays ranged from one to three weeks, depending on the complexity of the condition and the intervention performed (refer to **Table 6**).

Table 6. Definitive Treatment Modalities Employed Post-TBS Complications

Treatment Modality	**Number of Patients**	**Percentage (%)**
Open Reduction and Internal Fixation (ORIF)	18	36.73%
Debridement and Wound Management	9	18.37%
Amputation	2	4.08%
Manipulation and Plaster	5	10.20%
Skeletal Traction	3	6.12%
Physiotherapy	6	12.24%
Conservative/Supportive Treatment	6	12.24%
Total	**49**	**100%**

4. Discussion

The current research shows that musculoskeletal injuries are often treated with difficulty by traditional bone setters, who are still common in both rural and semi-urban areas. The analysis found that among all 49 patients studied, malunion was the most common complication, seen in 36.7% of cases. The high rate suggests TBS uses rough splints that do not depend on proper imaging, so there is often a problem with getting proper alignment after the injury. In 2009, Dada and her colleagues observed that malunion was common among TBS patients in Nigeria and pointed out that this issue

is significant around the world. Both of these challenges, nonunion (10.2%) and delayed union (12.2%), occurred frequently in our patients, as had been seen by Alam et al. in 2016, who said it was due to a lack of rest, overmanipulation, and starting therapy at the wrong time.

The study found that 10.2% of these cases were neglected dislocations, indicating that perhaps those practicing TBS do not have the skill to find or manage these injuries. Edusei et al. (2015) found similar results, reporting that not finding the right diagnosis and a delay in treatment were key reasons for chronic joint dysfunction. Besides skeletal problems, examples of soft tissue outcomes included compartment syndrome, Volkmann's ischemic contracture, and chronic osteomyelitis. Though their rates were small (under 5% each), they still call for attention. Similar problems had been noted by Ekere and Echem (2011), who also advised that chinling with traditional wrappings, especially without neurovascular monitoring, can rapidly cause nerve and blood flow problems.

Even though cellulitis and septic arthritis were uncommon in this research, they remain worrisome because many TBS have poor hygiene. Open or compound fractures are more likely to become infected because of inadequate hand washing after surgery, use of unsterile instruments, and applications of herbal remedies. Similar to these authors, more infections were found, which were again thought to result from bad wound care and exposure to toxic materials for long periods. Even though we found that systemic infection was uncommon, the cases of osteomyelitis we saw demonstrate how important antiseptic training is in TBS.

The study's outcomes mirror what is commonly found in South Asia and Sub-Saharan Africa. Onyemaechi et al. (2021) reported in their systematic review of multiple countries that traditional orthopedic practices most often led to malunion, nonunion, and infections. Taking into account the findings of Garikapati et al. (2023), patients who experienced complications with TBS took longer to recover, had higher and longer-lasting disability, and ended up with poorer functional results. The evidence suggests that what we see in Indian patients aligns with a wider pattern found in places where the need for orthopedic specialists is high and most treatments still come from traditional healers.

Public health is seriously affected by the kind of complications described here. Many patients who receive TBS care arrive at tertiary hospitals too late, and their serious conditions often call for urgent surgery. Osteotomy, debridement, internal fixation, or amputation cost a lot and usually extend the person's stay in the hospital. Seid and colleagues (2025) discovered that getting formal care late, often following an unsuccessful round of TBS, resulted in greater health problems and death. Moreover, most of our patients were employees paid daily wages or manual laborers. Long-lasting recovery can hurt people's health and leave families facing more financial hardship. The authors discovered a nonspecific acute socio-economic impact in their study of complications arising from fracture treatment in Pakistan.

The fact that TBS occurred in these circumstances is largely driven by the culture and social background of people. According to our research, the principal reason patients reported for choosing TBS was anxiety about surgery, then price, and finally not being aware of it. These observations agree with what Burford et al. (2007) discovered, which was that several rural communities believe hospitals to be costly, hard to reach, or frightening. Nwachukwu and her team (2011) indicated that people's fears of losing their lower limbs, stories they hear about mistakes in the hospital, and strong trust in traditional methods keep them using TBS. In addition, suggestions from relatives and friends usually influence how treatment is chosen, which often leads to continuous use of inexperienced medical services.

Since cultural beliefs, availability, and mistrust toward doctors play a part, completely stopping TBS practices seems unlikely and could make them exist without regulation. It will be more practical to help TBS fit within public health services by teaching and linking patients to needed services. It was proposed by Kumma et al. (2013) that giving TBS simple instructions on fracture diagnosis, cleanliness, and prompting referrals leads to positive outcomes without affecting their roles. Trust can be built in professional healthcare by providing health camps, mobile treatment centers, and repeated community programs with communication that fits the culture. The study by Edusei et al. (2015)

recommended that local leaders and community figures be asked to join health campaigns. This would encourage smiles and motivate people to avoid fearing hospitals.

Even so, this study has certain limitations. While 49 patients allowed for a trend analysis, it does not allow us to generalize much further. Because it was conducted at only one center, the study might not show regional differences in TBS treatment or results. The design did not include checks over time, meaning researchers could not judge how long individuals took to recover or return to work. Identical problems were recognized by Esin et al. (2020) in their study of TBS-managed injury cases. For more insight into recovery, future work should depend on research in the community, focus group conversations, and long-term studies of outcomes.

All in all, this paper reminds us that while many depend on traditional bone setting, the common complications could easily be prevented. The burden of malunion, nonunion, infection, and delayed presentation still affects both large hospitals and the lives of patients. Two things are needed: giving TBS smoother access to orthopedic services and using public health measures that welcome them instead of pushing them away. Proper policy actions, information campaigns, and strong legislation can lower the issues of TBS treatment and preserve both culture and autonomy.

5. Conclusion

The research underlines how frequent and harmful the complications are after using traditional bone setters for treating injuries. The patients we studied showed that malunion occurred in the largest number of cases, with delayed union coming next, followed by nonunion and neglected dislocations. The consequences of TBS were directly caused by the substandard methods it applied, for example, simple splints, missing radiology, and poor aseptic precautions. Adding to these risks are other issues such as compartment syndrome, ongoing infections in the bone, and pain associated with stiff joints from traditional fracture care. The data suggests that most childbirth injuries result in late hospital visits and the requirement for major, time-consuming treatment. The majority of people affected had limited resources and their decision to use TBS mainly resulted from worry about surgery, financial issues and strong cultural beliefs. These findings agree with broader research from India, Africa and Southeast Asia which highlights the importance of finding effective solutions. Because of this, public health should prioritize policies that lead to early orthopedic consultations and teach people in communities what to do. Rather than trying to delete TBS practices, an efficient solution is to help communities become more conscious, train them in basic first aid and hygiene and develop official ways to get medical care. These workers can act as useful go-betweens, working to inform rural people about the serious problems that arise from not getting fracture care on time or correctly. Integrative and culturally careful approaches to treatment help reduce the problems of old-fashioned bone setting, enhancing the musculoskeletal health of at-risk people.

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