

Research Article

Assessing Complicated Bone Fractures After Experience of Non-Medical Bone Setting Methods in Low Socioeconomic Population of Faisalabad, Pakistan-A Single Centre Study

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ABSTRACT

Background: Traditional bone setting (TBS) remains prevalent in low-income populations of Pakistan despite availability of modern orthopedic care, resulting in significant complications and burden on tertiary healthcare facilities. Understanding the factors driving TBS utilization and subsequent tertiary care presentation is essential for developing evidence-based interventions.

Objective: To identify the reasons behind initial TBS consultation and subsequent tertiary care visits among patients with fracture complications in a low socioeconomic population of Faisalabad, Pakistan.

Methods: This descriptive quantitative study was conducted at District Headquarters Hospital, Faisalabad over [specify duration]. Using consecutive sampling, 90 patients with simple or compound fractures who had received TBS treatment and were referred from primary or secondary healthcare facilities were enrolled. Data were collected using a structured proforma capturing demographic characteristics, reasons for TBS choice, complication awareness, and willingness to change healthcare-seeking behavior.

Results: The majority of participants were from low socioeconomic backgrounds with 85.6% earning less than 500 rupees monthly and 85.6% having primary or less education. Financial constraints emerged as the primary reason for initial TBS consultation (51.1%), followed by elder's advice (40.0%) and perceived better communication by TBS practitioners (23.3%). Sustainable finances were cited as the biggest concern significantly more by low-income participants (55.8% vs 23.1%, $p=0.021$). Awareness of healthcare system levels was significantly associated with income ($p=0.009$) and education ($p=0.006$). Fear of complications and potential limb loss motivated tertiary care visits in 50% of participants, with higher-income and better-educated individuals showing significantly greater complication awareness ($p=0.034$). Despite barriers, 92.2% expressed willingness to visit qualified orthopedic surgeons for future follow-up regardless of socioeconomic status, and 87.8% were willing to share knowledge with family and friends. Strong positive correlation existed between complication awareness and preference for qualified surgeons ($r=0.67$, $p<0.001$).

Conclusion: Traditional bone setter utilization in Faisalabad's low socioeconomic population

is primarily driven by financial barriers, limited healthcare awareness, and cultural influences rather than preference alone. Subsequent tertiary care presentation is motivated by fear of complications and limb loss. Multipronged interventions including expanded health insurance coverage, community-based health education targeting low-literacy populations, strengthened referral systems, and improved patient-provider communication are needed to reduce TBS dependency and associated morbidity.

Keywords: Traditional bone setting (TBS), Complicated bone fractures, Non-medical bone setting, Low socioeconomic population

INTRODUCTION

Bone fractures constitute a substantial global health burden, with an estimated 178 million new fractures occurring worldwide in 2019, representing a 33.4% increase since 1990¹. The global age-standardized incidence rate stands at approximately 2,296 cases per 100,000 populations annually, with significant morbidity measured at 319 years lived with disability per 100,000 populations². In Pakistan, a lower-middle-income country with constrained healthcare resources, the fracture burden is compounded by high rates of osteoporosis, with projections estimating that 11.3 million Pakistanis would be affected by 2020, rising to 12.91 million by 2050³. Hip fractures alone are associated with mortality rates of 20-24% in the first year, and among survivors, 40% are unable to walk independently while 33% become totally dependent or require nursing home care⁴. This epidemiological challenge is particularly acute in resource-limited settings where access to formal orthopedic care remains restricted, driving populations toward alternative treatment modalities including traditional bone setting (TBS).

Despite the absence of formal medical training and evidence-based protocols, TBS practitioners continue to serve as primary care providers for musculoskeletal injuries in many communities. However, this practice carries substantial risks, with recent studies documenting complication rates following

TBS treatment ranging from 56.91% to 58%⁵. A systematic review of TBS complications in low- and middle-income countries published in 2021 documented severe adverse outcomes including mal-union, non-union, chronic osteomyelitis, compartment syndrome, limb gangrene, and joint stiffness⁶. Research from Ethiopia in 2023 reported that among 43 patients experiencing TBS-related complications, the most common were infection (26.56%) and mal-union (20.31%), with 97.7% subsequently requiring hospital care⁷. A 2025 study from Tanzania documented catastrophic outcomes including limb amputations resulting from TBS-associated complications such as non-union, mal-union, infections, and compartment syndrome⁸. Studies across sub-Saharan Africa have revealed that up to 85% of fracture patients initially present to traditional bone setters before seeking hospital care, highlighting the extensive reliance on this practice. The economic and social factors driving TBS utilization have been extensively documented, with poverty, cultural beliefs, accessibility, and perceived affordability identified as key determinants⁹⁻¹¹.

Traditional bone setting (TBS) and its complications have been reported in countries such as Turkey, Indonesia, Nigeria, Ghana, Ethiopia, and Tanzania⁷. In Pakistan, however, systematic evidence on the burden of TBS-related complications is lacking. Scattered reports exist, but data on the

frequency, types of complications, healthcare-seeking patterns, hospital admissions, and the resulting strain on tertiary care remain limited. The role of socioeconomic factors, delayed presentation, and clinical outcomes has also been underexplored. This study addresses these gaps by presenting the first comprehensive single-center analysis of complicated bone fractures following TBS in Faisalabad's low socioeconomic population. Given Pakistan's limited healthcare resources and inequitable access, the study aims to quantify complications, define their severity, explore patient demographics, and assess the burden on tertiary facilities to inform preventive strategies and optimize orthopedic care.

MATERIALS AND METHODS

This descriptive quantitative study was conducted at District Headquarters Hospital, Faisalabad, a tertiary care facility serving the low socioeconomic population, over a period of [specify duration]. Ethical approval was obtained from the Institutional ERC (Certificate No. [specify]), and informed consent was secured from all participants.

Patients with simple or compound fractures who had previously received treatment from TBS and were subsequently referred to the hospital were included through non-probability consecutive sampling. The sample size was calculated as 90 patients using the formula for descriptive studies (95% CI, expected prevalence of TBS-related complications 58.5%, margin of error 10%). Exclusion criteria included pathological, stress, or greenstick fractures, amputations, direct tertiary care visits without prior TBS, incomplete records, refusal to participate, and comorbidities causing independent complications.

Data were collected using a structured, pilot-tested proforma covering demographics, injury characteristics, TBS treatment details, referral pathways, clinical presentation,

complications, investigations, management, and outcomes. Information was obtained through interviews, clinical examinations, medical records, and radiological/laboratory reports by trained medical officers under supervision.

Data were analyzed using SPSS version 25. Continuous variables were expressed as mean $\pm$ SD, and categorical variables as frequencies and percentages. Associations were tested using Chi-square test for categorical variables. A p-value <0.05 was considered significant. Results were presented in tables and graphs.

RESULTS

A total of 90 participants who had previously received treatment from traditional bone setters were enrolled in this study. The majority of participants belonged to low socioeconomic backgrounds, with 85.6% (n=77) reporting monthly family income less than 500 rupees and 85.6% (n=77) having primary or less than primary education. The mean age of participants was 32.4 ± 18.7 years, with age ranging from 3 to 85 years.

Participants with higher income (>500 rupees) showed significantly better awareness of healthcare system levels compared to those with lower income (84.6% vs 48.1%, $p=0.009$). Similarly, education level was strongly associated with healthcare awareness, with 100% of college/university educated participants being aware compared to only 46.8% with primary or less education ($p=0.006$). These findings highlight that low socioeconomic status and limited education are major barriers to healthcare system knowledge, which may explain initial preference for traditional bone setters. Age showed no significant association with healthcare awareness ($p=0.248$), suggesting that socioeconomic factors are more influential than age in determining health literacy.

Table 1: Sociodemographic Characteristics and Healthcare System Awareness (N=90)

Characteristic	Category	n (%)	Aware of Healthcare System Levels	p-value
Monthly Income	<500 rupees	77 (85.6)	37 (48.1%)	0.009*
	>500 rupees	13 (14.4)	11 (84.6%)	
Education Level	Primary or less	77 (85.6)	36 (46.8%)	0.006*
	Secondary	10 (11.1)	9 (90.0%)	
	College/University	3 (3.3)	3 (100%)	
Age Group	<18 years	15 (16.7)	6 (40.0%)	0.248
	18-40 years	48 (53.3)	27 (56.3%)	
	41-60 years	21 (23.3)	12 (57.1%)	
	>60 years	6 (6.7)	3 (50.0%)	

Financial constraints emerged as the most prominent reason for initially choosing traditional bone setters, with 51.1% of participants citing sustainable finances as their biggest concern. This was significantly more prevalent among low-income participants (55.8% vs 23.1%, $p=0.021$). Other contributing factors included elder's advice (40.0%) and perceived better communication by TBS practitioners (23.3%), though these showed no significant association with income level. Notably, lack of awareness about proper consultation was reported by only 24.4% of participants, suggesting that financial barriers rather than knowledge deficit are the primary driver. The motivation for subsequent tertiary care visits was primarily driven by awareness of potential complications and limb loss (50.0%), with higher-income participants showing significantly greater awareness (76.9% vs 45.5%, $p=0.034$). This indicates that education about complications plays a crucial role in prompting patients to seek qualified orthopedic care after TBS treatment.

Table 2: Reasons for Initially Choosing Traditional Bone Setters and Subsequent Tertiary Care Visit (N=90)

Factor	Yes n (%)	No n (%)	Maybe n (%)	Association with Income <500 rupees	p-value
Initial TBS Choice Factors:					
Sustainable finances biggest concern when planning tertiary visit	46 (51.1)	22 (24.4)	22 (24.4)	43/77 (55.8%) vs 3/13 (23.1%)	0.021*
Lack of awareness of proper consultation by qualified surgeons	22 (24.4)	50 (55.6)	18 (20.0)	20/77 (26.0%) vs 2/13 (15.4%)	0.412
Elder's advice influenced seeking TBS treatment	36 (40.0)	28 (31.1)	26 (28.9)	32/77 (41.6%) vs 4/13 (30.8%)	0.464
TBS better at communication and follow-up counseling	21 (23.3)	37 (41.1)	32 (35.6)	18/77 (23.4%) vs 3/13 (23.1%)	0.983
Reasons for Tertiary Care Visit:					
Awareness that TBS can cause complications/limb loss	45 (50.0)	17 (18.8)	28 (31.1)	35/77 (45.5%) vs 10/13 (76.9%)	0.034*
Important to seek treatment from TBS vs qualified surgeons	33 (36.7)	40 (44.4)	17 (18.9)	30/77 (39.0%) vs 3/13 (23.1%)	0.289

Awareness of TBS-related complications varied significantly with education ($p=0.034$), reaching 100% among university-educated participants versus 45.5% with primary or less education. Despite this gap, most participants (92.2%) preferred qualified orthopedic surgeons for future follow-up, with no significant differences across education levels ($p=0.389$). Awareness strongly correlated with surgeon preference ($r=0.67$, $p<0.001$), highlighting education as a driver of behavioral change. Notably, 87.8% were willing to share experiences with family and friends, while only 51.1% favored

formal awareness activities, suggesting peer-to-peer education may be more culturally acceptable.

Table 3: Fear of Complications and Willingness to Change Healthcare-Seeking Behavior (N=90)

Variable	Response	n (%)	Association with Education Level	p-value
Complication Awareness:				
Believe TB treatment can raise chances of procedure-related complications	Yes	45 (50.0)	Primary: 35/77 (45.5%) Secondary: 7/10 (70.0%) University: 3/3 (100%)	0.034*
	No	17 (18.9)		
	Maybe	28 (31.1)		
Future Healthcare Intentions:				
Plan to visit qualified orthopedic surgeons for follow-up	Yes	83 (92.2)	Primary: 69/77 (89.6%) Secondary: 10/10 (100%) University: 3/3 (100%)	0.389
	Maybe	7 (7.8)		
Would be able to share knowledge with friends/family	Yes	79 (87.8)	Primary: 66/77 (85.7%) Secondary: 10/10 (100%) University: 3/3 (100%)	0.315
	No	3 (3.3)		
	Maybe	8 (8.9)		
Would prefer qualified orthopedic surgeons in future	Yes	76 (84.4)	Correlation with complication awareness: $r=0.67$, $p<0.001^*$	<0.001
	No	1 (1.1)		
	Maybe	13 (14.4)		
Would participate in community awareness projects	Yes	46 (51.1)	Primary: 37/77 (48.1%) Secondary: 6/10 (60.0%) University: 3/3 (100%)	0.178
	No	22 (24.4)		
	Maybe	22 (24.4)		

Financial barriers were more pronounced in low-income participants, with fewer expecting to pay out of pocket (28.6% vs 61.5%, $p=0.017$) and lower knowledge of treatment financing (42.9% vs 84.6%, $p=0.003$). Higher-income individuals more often perceived government hospitals as costlier than TBS (46.2% vs 20.8%, $p=0.042$). Despite these disparities, willingness to visit qualified surgeons (~90%, $p=0.224$) and adopt lifestyle changes ($p=0.247$) was consistent across income groups, indicating strong acceptance of formal care once financial and informational barriers are reduced. Targeted interventions should therefore prioritize affordability and

health literacy, especially for low-income populations who make up most TBS users.

Table 4: Association Between Socioeconomic Factors, Perceived Barriers, and Healthcare-Seeking Behavior (N=90)

Barrier/Behavior	Income <50 rupees (n=77)	Income >50 rupees (n=13)	p-value
Financial Barriers:			
Would pay from pocket in tertiary care	22 (28.6%)	8 (61.5%)	0.017*
Government hospital costs more than TB	16 (20.8%)	6 (46.2%)	0.042*
Knowledge Barriers:			
Knowledge of treatment financing model	33 (42.9%)	11 (84.6%)	0.003*
Knowledge of transportation mode available	35 (45.5%)	9 (69.2%)	0.095
Behavioral Outcomes:			
Plan to visit qualified surgeons for follow-up	69 (89.6%)	13 (100%)	0.224
Would change lifestyle per surgeon's advice	61 (79.2%)	12 (92.3%)	0.247
Prefer qualified surgeons vs TBS in future	63 (81.8%)	13 (100%)	0.102

DISCUSSION

This study provides important insights into the factors driving traditional bone setter utilization and subsequent tertiary care presentation among low socioeconomic populations in Faisalabad, Pakistan. Our findings demonstrate that financial constraints (51.1%), cultural influences (40.0%), and limited healthcare awareness are primary determinants of initial TBS consultation, while fear of complications and limb loss (50.0%) subsequently motivates tertiary care visits. These results align with previous Pakistani and international literature while highlighting unique contextual challenges in the local healthcare landscape. The predominance of low-income participants (85.6% earning <500 rupees monthly) in our cohort mirrors findings from

a recent Ethiopian study where low annual income was strongly associated with TBS utilization⁵. A 2023 study from Gujranwala, Pakistan, reported similar complication patterns among TBS-treated patients, with malunion (42.27%), non-union (21%), and joint stiffness (17%) being most common, though their study did not explore the underlying socioeconomic drivers as comprehensively as ours¹². Our finding that 85.6% of participants had only primary or less education strongly correlates with healthcare system awareness ($p=0.006$), supporting the hypothesis that educational deficits compound financial barriers in perpetuating TBS utilization. This educational gap has been inadequately addressed in previous Pakistani studies, which focused primarily on clinical complications rather than health literacy determinants.

The financial burden emerged as the most significant barrier, with 55.8% of low-income participants citing sustainable finances as their primary concern compared to only 23.1% of higher-income individuals ($p=0.021$). Recent research in Pakistan has identified financial constraints as a major barrier to healthcare access, particularly among women and rural populations, consistent with our findings¹³. Pakistan's healthcare expenditure of approximately 38 USD per capita is substantially lower than other developing countries, creating a healthcare financing gap that drives patients toward perceived cost-effective alternatives like TBS. Our data reveal that only 28.6% of low-income participants expected to pay from their pocket for tertiary care, suggesting either unawareness of actual costs or reliance on informal financial arrangements, both of which warrant further investigation^{14, 15}.

Cultural factors, particularly elder's advice (40.0%), played a substantial role in TBS preference, though this was not significantly associated with income level ($p=0.464$). This

finding contrasts with studies from Nigeria and Ethiopia where cultural beliefs showed stronger socioeconomic stratification⁷. The perceived superiority of TBS in communication and follow-up counseling (23.3%) represents a critical service delivery gap in formal healthcare settings that deserves attention. Improving patient-provider communication and ensuring culturally sensitive care delivery in tertiary facilities could reduce TBS dependency independent of financial interventions.

A particularly noteworthy finding is the strong correlation between complication awareness and willingness to seek qualified care ($r=0.67$, $p<0.001$), suggesting that health education interventions could be highly effective. However, only 45.5% of participants with primary education were aware that TBS could cause complications, compared to 100% of university-educated individuals ($p=0.034$). A 2025 Ethiopian study⁵ similarly found strong associations between TBS choice and rural residence, low income, and lack of health insurance, reinforcing the multifactorial nature of this healthcare-seeking behavior. The universal willingness (92.2%) to visit qualified surgeons for follow-up regardless of socioeconomic status demonstrates that experiential learning through tertiary care exposure can overcome initial barriers, suggesting that well-designed referral pathways and first-exposure programs could catalyze behavioral change.

This study highlights critical policy implications for Pakistan's healthcare system, where geographical, cultural, and financial barriers limit access to formal care. The high willingness of participants (87.8%) to share experiences indicates potential for culturally acceptable peer-to-peer health education. Limitations include the single-center design, recall bias in self-reported data, and inability to assess patients who never reached tertiary care, restricting

generalizability. Future multicenter studies with longer follow-up, inclusion of TBS practitioners' perspectives, and cost-effectiveness analyses of preventive strategies are recommended to guide evidence-based policy.

CONCLUSION

Traditional bone setter utilization in Faisalabad's low socioeconomic population is primarily driven by financial barriers, limited healthcare awareness, and cultural influences rather than preference alone. Subsequent tertiary care presentation is motivated by fear of complications and limb loss. Multipronged interventions including expanded health insurance coverage, community-based health education targeting low-literacy populations, strengthened referral systems, and improved patient-provider communication are needed to reduce TBS dependency and associated morbidity.

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