

Article

Status of Physiotherapy Practices Following Total Knee Replacement in Oman: Adherence to Guidelines and Identification of Barriers

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Abstract

Background: The rising incidence of knee osteoarthritis in Oman has increased the demand for total knee replacement (TKR) surgeries, highlighting the critical role of evidence-based postoperative physiotherapy. However, no prior study has systematically assessed physiotherapy practices post-TKR in Oman. This study aimed to fill this gap by assessing current physiotherapy practices post-TKR in Oman, evaluating adherence to international guidelines, and identifying barriers to optimal care. **Methods:** A cross-sectional study was conducted between January and March 2025 using a self-administered, structured questionnaire distributed to 189 physiotherapists in governmental hospitals. Data were analyzed using descriptive statistics with SPSS version 26. **Results:** High adoption rates were found for preoperative education (94.2%) and strengthening exercises (95.3%). In acute-stage rehabilitation, functional training (96.35%) and early mobilization (94.27%) were prevalent. However, utilization of standardized outcome measures (e.g., WOMAC) was low (74.47%) and variability existed in discharge criteria. Major barriers included a shortage of physiotherapists (91.66% agreement), limited resources (92.18%), and patient-related challenges (94.79%). **Conclusion:** While foundational rehabilitation practices are implemented effectively in Oman, significant gaps remain in standardized assessments and adherence to specific international protocols. Addressing workforce shortages, resource limitations, and implementing unified national guidelines are essential for optimizing post-TKR rehabilitation outcomes.

Keywords: total knee replacement; physiotherapy; rehabilitation; Oman; guidelines; barriers



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1. Introduction

Osteoarthritis (OA) is one of the leading causes of pain, disability, and reduced quality of life worldwide, with the knee joint being most commonly affected due to aging, obesity, and reduced physical activity [1,2]. Globally, the prevalence of knee osteoarthritis has increased substantially over recent decades, contributing to a growing demand for surgical interventions such as total knee replacement (TKR) [1]. Total knee replacement is widely recognized as an effective procedure for relieving pain, correcting gait abnormalities, and improving functional capacity in patients with end-stage knee OA [3]. However, postoperative outcomes are strongly influenced by the quality and consistency of rehabilitation provided following surgery [4].

International clinical guidelines, including those from the American Physical Therapy Association (APTA) and Enhanced Recovery After Surgery (ERAS) protocols, emphasize

the importance of evidence-based physiotherapy interventions following TKR [5]. These guidelines typically outline structured rehabilitation phases, including early mobilization, range-of-motion exercises, strengthening, functional training, and the use of standardized outcome measures to monitor recovery [5–10]. Despite the availability of such guidelines, substantial variability in post-TKR physiotherapy practices has been reported across countries, particularly in low- and middle-income settings where resource availability, staffing levels, and institutional policies may differ [10].

In the Middle East, the burden of knee osteoarthritis has increased markedly between 1990 and 2019, reflecting global epidemiological trends [2]. Oman has similarly experienced a rise in TKR procedures, with the number of surgeries increasing from 133 cases in 2020 to 533 cases in 2022, according to the Ministry of Health Annual Health Report [11]. This growing surgical demand places increased responsibility on physiotherapists to deliver effective postoperative rehabilitation and ensure optimal patient outcomes [12].

In Oman, a total of ten hospitals currently provide orthopedic surgical services, including total knee replacement procedures [13]. After undergoing TKR, patients are commonly recommended for postoperative rehabilitation. Physiotherapists are essential in managing pain, joint stiffness, muscle weakness, functional limitations, and gait abnormalities through personalized rehabilitation programs [12,13]. Long-term rehabilitation goals focus on restoring independence, enhancing functional mobility, and improving quality of life [6,13].

Despite ongoing efforts by the Ministry of Health to strengthen healthcare quality and accessibility in alignment with Oman Vision 2050 [11], several system-level and patient-related barriers continue to influence the delivery of physiotherapy services following TKR. These barriers include workforce shortages, variability in clinical expertise, infrastructure limitations, and challenges related to patient adherence and cultural factors [14–16]. Understanding these contextual factors is essential for improving the consistency and effectiveness of post-TKR rehabilitation services [12].

Therefore, this study aimed to assess current physiotherapy practices following total knee replacement in Oman, evaluate adherence to international rehabilitation guidelines, and identify barriers influencing optimal service delivery. It was hypothesized that physiotherapy practices in Oman would demonstrate partial adherence to international guidelines, with variability influenced by institutional, workforce, and patient-related factors.

2. Methods

This cross-sectional study was conducted between January and March 2025 to evaluate physiotherapy practices following total knee replacement (TKR) in governmental hospitals in Oman. The study targeted physiotherapists involved in musculoskeletal rehabilitation, specifically those with experience managing patients after TKR surgery. Physiotherapists without prior experience in TKR rehabilitation were excluded.

Ethical approval was obtained from the Research Committee of the College of Health Sciences at Nizwa University and the Health Studies and Research Approval Committee of the Ministry of Health, Sultanate of Oman. All participants received an information sheet explaining the study objectives and provided informed consent prior to participation. Confidentiality was ensured through anonymized data collection and secure data storage.

A convenience sampling method was used. Based on the total number of physiotherapists working in governmental hospitals in Oman, a sample size of 189 participants was considered adequate, assuming a 95% confidence level and a 5% margin of error. A total of 194 physiotherapists completed the questionnaire, yielding a response rate of 98%.

Data were collected using a self-administered structured questionnaire developed specifically for this study based on international clinical guidelines and previously pub-

lished literature on physiotherapy management following total knee replacement. The questionnaire consisted of Likert-scale and multiple-choice questions divided into five sections:

1. Demographic characteristics;
2. Preoperative physiotherapy practices;
3. Postoperative rehabilitation practices;
4. Discharge criteria and outcome measures, and;
5. Perceived barriers to optimal TKR rehabilitation.

Sample questionnaire items included statements such as: “Early mobilization within 24 h is recommended for TKR patients,” “Patient-centered outcome measures such as the WOMAC scale are routinely used in clinical practice,” and “Shortage of physiotherapists limits effective TKR rehabilitation.” (Annexure 1).

Content validity was assessed through review by an experienced research advisor to ensure relevance, clarity, and alignment with study objectives. A pilot study involving six senior physiotherapists was conducted to evaluate clarity, wording, and comprehensibility of the questionnaire items. Feedback from the pilot phase was used to refine the questionnaire prior to full-scale data collection. As the questionnaire was developed for the purpose of this study, formal psychometric testing, including internal consistency analysis, was not performed.

The final questionnaire was distributed in English using institutional email platforms. Participants were given adequate time to complete the questionnaire, and two reminder emails were sent to enhance the response rate. Participation was voluntary, and anonymity was maintained throughout the study.

3. Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. Descriptive statistics, including frequencies, percentages, and means, were used to summarize demographic variables and responses to Likert-scale items. The results were presented to describe current physiotherapy practices, discharge criteria, outcome measure usage, and perceived barriers to post-TKR rehabilitation in Oman.

4. Results

4.1. Demographic Characteristics:

The demographic profile of the study participants ($N = 192$) is summarized in Table 1. The majority were female (62.5%, $n = 120$) and held a Diploma as their highest qualification (62.5%, $n = 120$). A significant proportion had over 16 years of experience in musculoskeletal rehabilitation (38.5%, $n = 74$), and the largest group practiced in the Muscat governorate (43.8%, $n = 84$).

Table 1. Demographic details of the participants.

	Frequency	Percent
Gender		
Female	120	62.5%
Male	72	37.5%
Highest qualification		
Bachelor	69	35.9%
Diploma	120	62.5%
Master	2	1.0%
Others	1	0.5%

Table 1. Cont.

	Frequency	Percent
Years of experience in musculoskeletal rehabilitation		
1 to 6	32	16.7%
11 to 15	61	31.8%
6 to 10	25	13.0%
Above 16	74	38.5%
Governorate of practice		
AL Buraimi	10	5.2%
AL Dakhila	23	12.0%
AL Dhahirah	9	4.7%
Dhofar	13	6.8%
Musandam	8	4.2%
Muscat	84	43.8%
North Batinah	9	4.7%
North Sharqiah	8	4.2%
South Batinah	16	8.3%
South Sharqiah	12	6.3%

4.2. Preoperative and Postoperative Practices

A high majority of respondents reported providing preoperative education (94.8%, $n = 182$) and prescribing preoperative strengthening exercises (95.3%, $n = 183$) (Table 2). In the acute postoperative phase, early mobilization within 24 h was widely recommended (94.27%, $n = 181$ agreed/strongly agreed) and functional training to improve daily activities was highly prevalent (96.35%, $n = 185$ agreed/strongly agreed) (Figure 1).

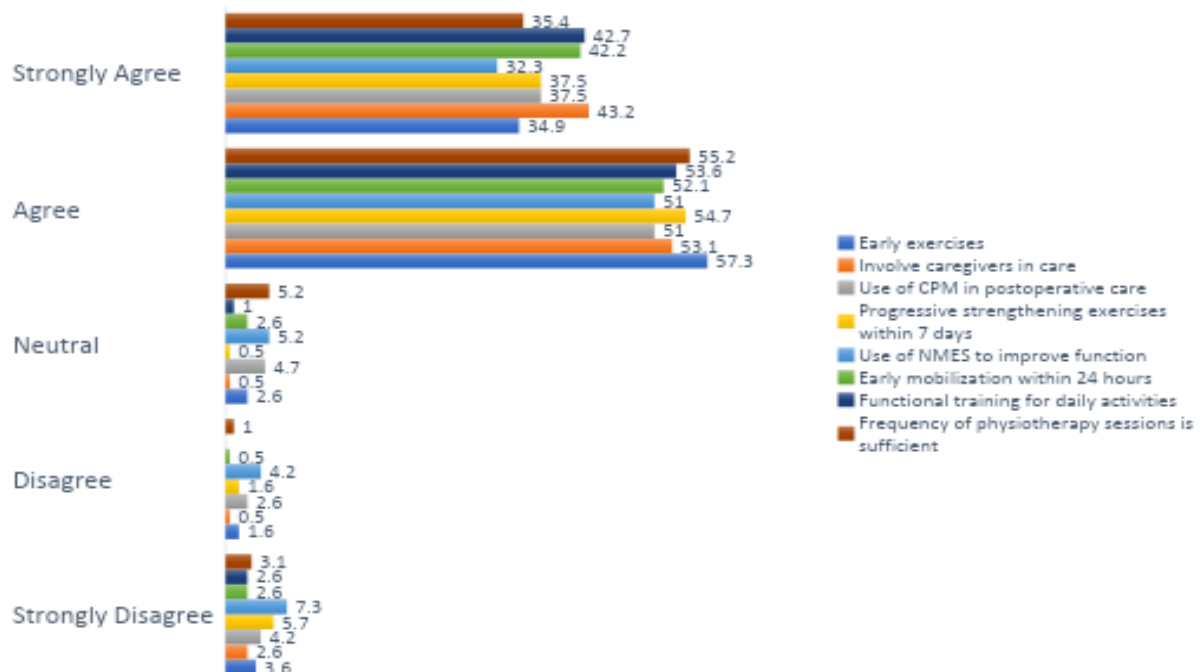


Figure 1. Practice of postoperative physiotherapy care (response in %).

Table 2. Practice of Preoperative Physiotherapy.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
1	Provision of preoperative flexibility exercise.	8 (4.2%)	2 (1.0%)	5 (2.6%)	115 (59.9%)	62 (32.3%)
2	Preoperative patient education	8 (4.2%)	1 (0.5%)	1 (0.5%)	89 (46.4%)	93 (48.4%)
3	Preoperative strengthening exercise	7 (3.6%)	1 (0.5%)	1 (0.5%)	93 (48.4%)	90 (46.9%)

4.3. Discharge Criteria and Recommendations

Functional status and mobility were the most strongly agreed-upon discharge criteria (94.79%, *n* = 182 agreed/strongly agreed). A significant majority also endorsed prescribing exercise prior to discharge (94.27%, *n* = 181 agreed/strongly agreed) (Table 3). There was strong support for a one-on-one therapist-patient ratio (91.66%, *n* = 176 agreed/strongly agreed) and for the use of tele-rehabilitation (94.79%, *n* = 182 agreed/strongly agreed) (Table 4). These findings are illustrated in Figures 2 and 3. (Tables 4 and 5).

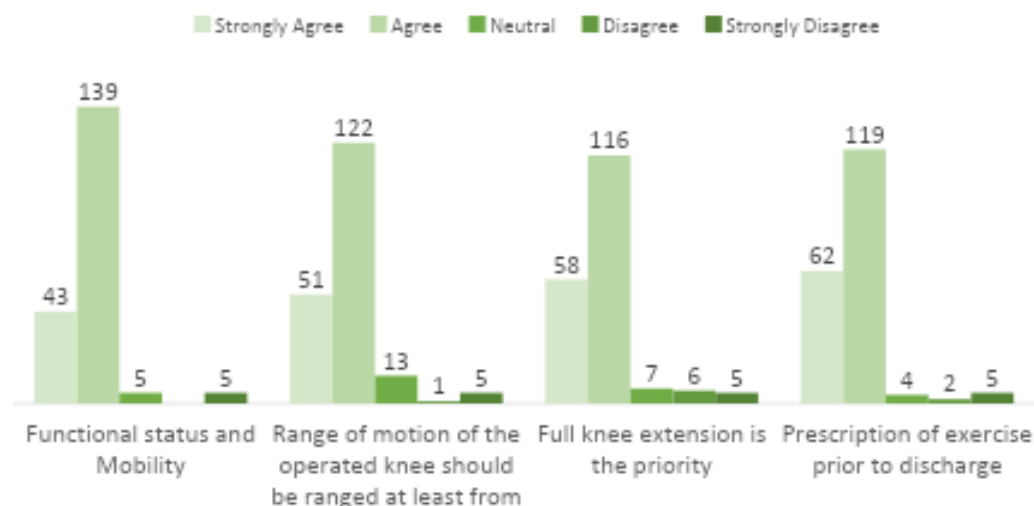
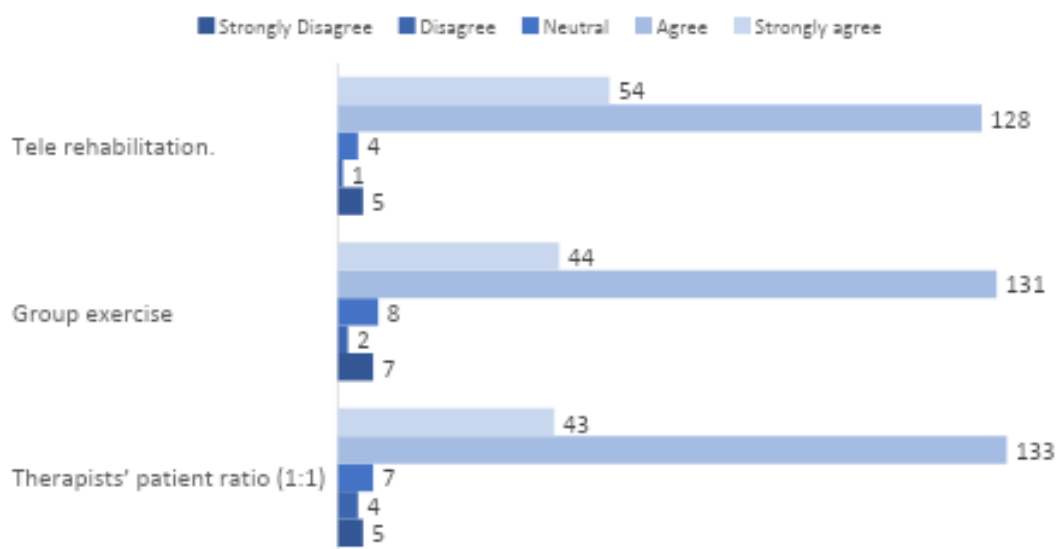
**Figure 2.** Preferred discharge criteria among physiotherapists (response in %).**Figure 3.** Recommendations for postoperative rehabilitation delivery (response in %).

Table 3. Discharge criteria preferred.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Functional status and Mobility	5 (2.6%)	0(0%)	5 (2.6%)	139 (72.4%)	43 (22.4%)
Range of motion of the operated knee should be ranged at least from (0 to 100)	5 (2.6%)	1 (0.5%)	13 (6.8%)	122 (63.5%)	51 (26.6%)
Full knee extension is the priority	5 (2.6%)	6 (3.1%)	7 (3.6%)	116 (60.4%)	58 (30.2%)
Prescription of exercise prior to discharge	5 (2.6%)	2 (1.0%)	4 (2.1%)	119 (62.0%)	62 (32.3%)

Table 4. Recommendations for post-operative care.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Therapists' patient ratio (1:1)	5 (2.6%)	4 (2.1%)	7 (3.6%)	133 (69.3%)	43 (22.4%)
Group exercise	7 (3.6%)	2 (1.0%)	8 (4.2%)	131 (68.2%)	44 (22.9%)
Tele-rehabilitation.	5 (2.6%)	1 (0.5%)	4 (2.1%)	128 (66.7%)	54 (28.1%)

Table 5. Use of outcome measures.

	Strongly Disagree	Disagree	Neutral	Agree to	Strongly Agree
Objective measures (goniometer, strength, TUG). TUG = time up-and-go.	5 (2.6%)	6 (3.1%)	12 (6.3%)	135 (70.3%)	34 (17.7%)
Functional measurements (sit-to-stand and informal gait assessment are important)	5 (2.6%)	5 (2.6%)	19 (9.9%)	121 (63.0%)	42 (21.9%)
Patient-centered tools (e.g., WOMAC scale, lower limb functional scale) for TKR persons. WOMC = Eastern Ontario and McMaster universities.	6 (3.1%)	12 (6.3%)	31 (16.1%)	112 (58.3%)	31 (16.1%)
Regular reassessments	5 (2.6%)	1 (0.5%)	8 (4.2%)	131 (68.2%)	47 (24.5%)

4.4. Use of Outcome Measures

The use of objective measures like goniometers and TUG tests was high (88.02%, $n = 169$ agreed/strongly agreed). However, the utilization of patient-centered tools like the WOMAC scale was moderate (74.47%, $n = 143$ agreed/strongly agreed). Regular reassessments were highly favored (92.70%, $n = 178$ agreed/strongly agreed) (Table 5).

4.5. Perceived Barriers

The most significant barriers identified were a shortage of physiotherapists (91.66%, $n = 176$ agreed/strongly agreed), lack of infrastructure (92.18%, $n = 177$ agreed/strongly agreed), and patient-related factors (94.79%, $n = 182$ agreed/strongly agreed), including lack of exercise adherence (93.22%, $n = 179$ agreed/strongly agreed) (Figure 4).

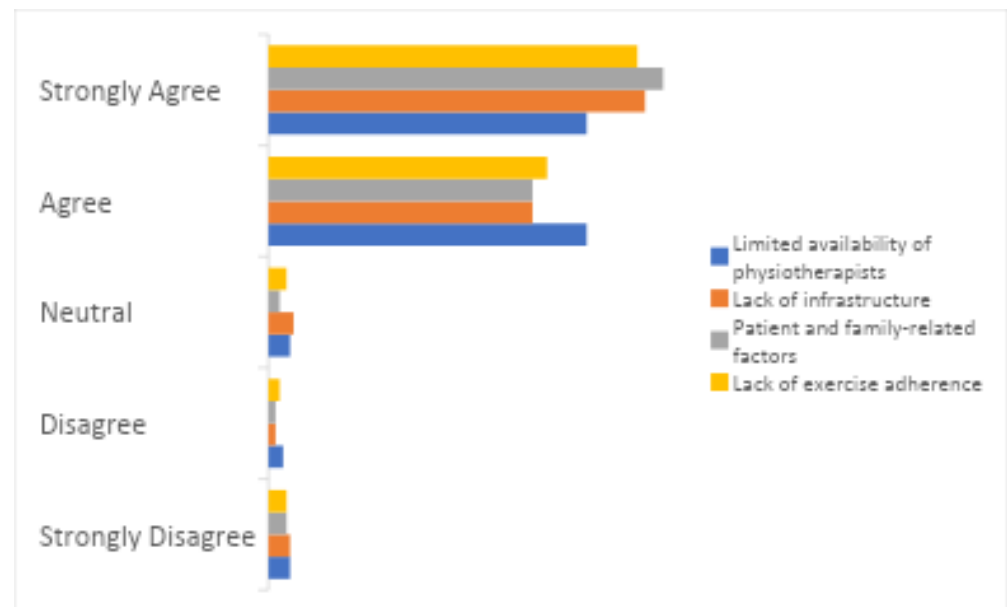


Figure 4. Perceived Challenges for TKR rehabilitation.

5. Discussion

This study assessed physiotherapy practices in Oman following total knee replacement (TKR) to identify potential gaps or barriers affecting the quality of care. The findings offer insights into rehabilitation practices post-TKR among physiotherapists in various healthcare settings. To our knowledge, this is the first study to systematically evaluate these practices in Oman. Most respondents emphasized the crucial role of pre-operative physiotherapy in preparing patients for surgery and improving post-operative outcomes. The high adoption rates of preoperative education (94.2% favorable) and strengthening exercises (95.3% favorable) align with global studies linking preoperative interventions to improved surgical outcomes [17]. For example, Khan reported a 25% increase in post-operative mobility due to preoperative quadriceps training, highlighting the importance of preoperative exercises [18]. However, the relatively lower adoption of pre-TKR flexibility training (91.6% favorable) may indicate inconsistent prioritization of joint mobility, a concern also observed in Jordan [19].

In acute-stage rehabilitation, the favorable responses for functional training (96.35%) and early mobilization (94.27%) reflect evidence-based practices [20]. Early ambulation has been shown to reduce complications like deep vein thrombosis [21], while functional training aligns with ERAS protocols endorsed by orthopedic guidelines [22]. However, the moderate use of neuromuscular electrical stimulation (NMES) (83.33% favorable) contrasts with other regional settings reporting alternative modalities [23].

The partial avoidance of continuous passive motion (CPM) devices (88.54% favorable) is inconsistent with current practice trends, as the evidence for long-term benefits of CPM is limited [24]. This lingering usage may be compared to specific clinical protocols investigated in Turkey where rigid standardizations are strictly implemented [7,24].

Furthermore, the low favorable rate for digital rehabilitation (79.16%) may be due to infrastructural barriers such as limited internet access in rural areas, hindering the adoption of telehealth [25,26]. Challenges in digital adoption were also analyzed in regional digital health reviews across the Indian subcontinent and Gulf territories, where systematic physician training significantly influences technology uptake [27]. In contrast, unified digital platforms highlighted in the Ministry of Health Annual Health Report offer a potential system framework for Oman to expand digital connectivity [28].

In discharge criteria and post-discharge care, the slightly lower adherence to range of motion (ROM) thresholds (90.10% favorable for 0–100° flexion) suggests variability in applying numerical benchmarks, a clinical phenomenon explored in contemporary mobility trials [29]. This indicates Oman's preference for holistic evaluation, balancing quantitative goals with clinical judgment—a strategy validated in resource-constrained settings [30]. The post-discharge care strengths in home exercise programs (94.27% favorable) align with structured home interventions reducing 30-day readmissions [31].

The study also revealed low utilization of standardized assessment tools like WOMAC (74.47% favorable), hindering accurate monitoring of patient progress and treatment effectiveness, which remains a key area of improvement in clinical trial protocols [32]. Goniometers and timed up and go (TUG) tests showed high approval rates (88.02%), reflecting their validation role in post-TKR rehabilitation [33,34]. Moreover, functional assessment (sit to stand) and gait evaluation received strong support, as sit-to-stand (STS) exercises are associated with quadriceps strength recovery and readiness for discharge [35]. The lower limb functional scale is also recognized as more effective in specific patient populations [36]. Furthermore, routine reassessment received high favorability (92.70%), aligning with reports indicating optimized clinical tracking with regular evaluations [37].

Physiotherapy practice in Oman follows various guidelines, with some practitioners relying on individual clinical experiences to address specific patient needs, potentially leading to an unstandardized approach and greater variability in recovery outcomes [38]. Some physical therapists managing patients without strict protocols may impact the quality of care, suggesting that expanding tele-rehabilitation models and training community health workers can help alleviate workforce gaps [39]. Moreover, the findings should be interpreted with caution, as the use of a non-standardized questionnaire may influence the generalizability of the results [40].

Regarding regional context and system barriers, the local healthcare dynamics provide crucial context. In Oman, a total of ten hospitals currently provide orthopedic surgical services, including total knee replacement procedures, where physiotherapists face unique challenges related to equipment availability in rural Omani clinics, staffing shortages, and cultural or linguistic barriers [11,15]. For instance, rural facilities face high therapist-patient ratios compared to urban centers, as noted in Oman's Vision 2050 progress reports [11]. These patient-related and cultural challenges mean that a notable proportion of patients miss sessions due to psychological and access barriers [15].

6. Limitation

However, this study has limitations. The participant group may not fully represent the broader population, particularly individuals in rural areas and the private sector. The cross-sectional methodology only provides a snapshot in time, restricting long-term trend analysis. The questionnaire mainly included structured, Likert-scale, closed-ended questions, which limit qualitative exploration. Future research should consider a mixed-methods approach to combine qualitative depth with longitudinal analysis of rehabilitation outcomes and compare physiotherapy practices post-total knee replacement in government and private sectors.

Furthermore, the questionnaire used in this study was developed specifically for this research and was not a previously standardized instrument; therefore, formal psychometric testing was not conducted.

7. Conclusions

This study examines physiotherapy practices for total knee replacement (TKR) patients in Oman, emphasizing the significance of pre- and post-operative rehabilitation. Despite the

common adherence to early mobilization protocols and general rehabilitation guidelines, there is a gap in the utilization of standardized assessment tools, particularly in the pre-operative phase. Discharge criteria and outcome measures also show variability. Systemic challenges such as the lack of national guidelines, high patient volumes, and limited resources affect service quality. To improve professional consistency in TKR rehabilitation and patient outcomes, implementing standardized clinical frameworks, allocating resources effectively, and collaborating on policy reforms are crucial.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of College of Health Sciences, Nizwa University [CHS/F/20/2024-25] and date of approval: [13 November 2024].

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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