ORIGINAL ARTICLE

EXPLORING THE PHYSICAL THERAPIST ROUTINE REHABILITATION AFTER TOTAL KNEE ARTHROPLASTY IN TERTIARY CARE HOSPITALS OF PESHAWAR; A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Total knee arthroplasty is a surgical replacement of a knee joint. Evidence-based physiotherapy protocol plays a major role in the rehabilitation after replacement surgery to perform daily life and sports activities without pain, discomfort, and limited knee function.

Objectives: To explore the physical therapist routine rehabilitation after total knee arthroplasty and physiotherapist's advice for returning to sports after total knee arthroplasty.

Methods: A cross-sectional study was conducted on 97 physical therapists working in tertiary care hospitals in Peshawar from December 2020 to May 2021. Both male and female physiotherapists with age ranging from 24 to 45 years, having at least one year of orthopedic rehabilitation experience, and working in private and government tertiary hospitals were recruited via census sampling technique. Those having no experience in orthopedic rehabilitation were excluded from the study. The data was collected via a structured questionnaire. The data was analyzed using SPSS version 25

Results: Most of the participant's age were n=77 (79.4%), ranging from 25-29 years. About (85.6%) physical therapists had an experience of 1-5 years. 93% of physical therapists recommended the RICE protocol to reduce swelling. About 53% recommended cooling (for pain relief), 70% recommended CPM (for mobility) while 71% recommended open chain exercise for muscle strength. 84.7% physical therapists recommended sports to the patient after knee arthroplasty. There was a non-significant association in variation of protocols between Government and Private Hospitals.

Conclusion: The study concluded that most physical therapists use RICE principles (Rest, Ice, Compression, Elevation), cryotherapy, and passive exercise therapy, such as Continuous Passive Motion (CPM), along with various walking exercises, closed chain exercises, and bridging exercises for rehabilitating patients after total knee replacement surgery. Interestingly, the recommendations for sports activities post-total knee arthroplasty were up to date across individual athletes. Additionally, there was no significant difference observed in the protocols for total knee replacement between government and private hospitals.

Key Words: Athletic Population, Knee Rehabilitation, Physiotherapist, Total Knee Replacement

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Introduction

Osteoarthritis (OA) is the degenerative joint disease due to loss of joint surface especially cartilage causing the joint to become stiff and painful. A study showed the prevalence of osteoarthritis to be 26.67/1,000 people in Pakistan.[1]The major reason for disability in people aged 65 or more is the degenerative disease of joint termed as osteoarthritis

(OA).[2] Osteoarthritis is the eleventh leading reason for causing morbidity worldwide.[3] TKA consist of replacing the degenerated articulated knee surface with implant. OA is also caused because of post traumatic changes in joint, rheumatoid arthritis and 95% of others pathological conditions of knee joint. Changes in risk factors may affect outcomes after TKA.[4] The total knee arthroplasty procedure for this degenerative disease is dramatically rising throughout the world.[4] Total knee arthroplasty (TKA) is indicated whenever all the drug, non-drug, topical treatments and steroidal joint injections stop improving the patient symptoms[1]. Patients after TKA showed less satisfaction rate due to the complex anatomy of knee joint as compared to hip joint.[5] Post-op TKA outcomes maybe affected by treating both modifiable and non-modifiable risk factors.[5] TKA is the effective treatment option for people with knee osteoarthritis, but there are some risk factors like age, co-morbidities and obesity which affect outcomes after TKA.[6] In 2014, a prevalence study of revision arthroplasty in the United States concluded that between 2014-2030 , revision total hip arthroplasty cases were raised from 43% to 70% and revision total knee arthroplasty found to increase by 78% to 182%.[7]

A study suggested that the young active runners, wrestlers and weight lifters are more prone to have knee osteoarthritis due to traumatic knee injuries like cruciate ligaments and meniscal tears.[8] Another study showed that anterior cruciate ligament reconstruction does not reduces the occurrence of knee OA in athletes directly, while it prevents injury to cartilage and menisci which causes the knee OA.[9] According to a study, osteoarthritis and total knee arthroplasty in male ex-footballers were 2-3 times higher compared to the general population and it is considered an occupational hazard in professional footballers due to repetitive insults and micro traumas to knee joint, which cause knee pain and degeneration of knee joint.[10] Patients who operated for hip or knee arthroplasty, are advised that high impact and repetitive loading activities effect on implants and may shorten the life span of implants.[11]

Patients after TKA should receive physiotherapy services to improve knee joint range of motion by avoiding knee stiffness.[11] In order to improve functional recovery of knee joint, quadriceps strength and size are suggested as most important in rehabilitation.[12] A study showed low quality evidence of pre-operative quadriceps strength association with positive outcomes after TKA at 6th month.[13] Physiotherapy services in rehabilitation program after TKA is very important and plays a major role in prognosis. In wards rehabilitation, physical therapists work on a patient to mobilize patient and target functional goals. Home programs include promoting functional improvement and retraining protocols of the operated joint but all the above protocols vary in content and duration from patient to patient.[14]

This study aimed to determine the current rehabilitation methods of physical therapist, their advice for returning to sports activities after knee arthroplasty, and to find the variations in physical therapist rehabilitation in private and government sectors. Physiotherapy protocols following TKR have a wealth of evidence internationally, but there is very limited evidence available at the national level on physical therapist's routine rehabilitation after total knee replacement. This study will help to point out the appropriate rehabilitation protocols for physical therapists regarding total knee arthroplasty rehabilitation and will also provide background for future studies.

Methods

A Cross-sectional study was conducted in all private and government tertiary care hospitals of Peshawar from December 2020 to May 2021. The ethical approval was taken from institutional review board (IRB) of Northwest Institute of Health Sciences Peshawar with ref# 3/11/23/NWIH-COPT/IRB/2021. All the participants were given the written informed consent. The total number of participants included in this study were 97. Census

sampling was used in this study. The inclusion criteria of the study were both males and female physiotherapists, having age between 24-45 years with at least one-year rehabilitation experience of dealing with TKA patients and working in private and government tertiary hospitals of Peshawar were included in the study. While the exclusion criteria were fresh graduates and physical therapists having no experience in rehabilitation of TKR patients were excluded. The data was collected through a self-administered questionnaire which was taken from a reference study.[15] This questionnaire was developed in Netherland by a team of expert physiotherapist. The components included in questionnaire were rehabilitations goals like pain relief, reduction of swelling, improve mobility, improve gait pattern, and improve muscular strength and core stability, and methods utilized for these goals. The Questionnaire was translated from Dutch to English language by expert's team of Ph.D. scholars. All the data was analysed using statistical package for social sciences (SPSS) version 25. The frequencies and percentages were calculated for variables in rehabilitation phases and chi-square test was applied to find the association of TKA protocols taken in government and private hospitals.

Results

This study's goal the aim of study was to determine the variations in physical therapy routine rehabilitation following total knee arthroplasty in Peshawar's government and private tertiary care hospitals of Peshawar. To accomplish this, a total of 97 physical therapists from Peshawar's tertiary care hospitals were recruited. Out of 97 respondents, 4 (4.1%) were between the ages of 40 and 45, and 77 (79.4%) were between the ages of 25 and 29. Men's responses were 58 (59.8%), while women's responses were 39 (40.2 %). Among total respondents, 58 male and 39 female were participated. 83 physiotherapists were filled questionnaire with holding rehabilitation experience ranging from 1 to 5 years.

Table I: Participants' demographic details

	Characteristics	Frequency (%)
` Age in years	25- 29	77(79.4%)
	30-34	14(14.4%)
	35-39	2(2.1%)
	40-45	4(4.1%)
Gender	Male	58(59.8%)
	Female	39(40.2%)
Physiotherapist Experience (Years)	1-5	83(85.6%)
	6-10	11(11.3%)
	11-17	3(3.1%)
Rehabilitation period after TKA	<3 months	35 (36.1%)
	3-6 months	53 (54.6%)
	6-9 months	4 (4.1%)
	9-12months	4 (4.1%)
	>18 months	1 (1.0%)
Total		97 (100%)

Table II: Outcomes of multiple responses questions on the current practices

Rehabilitation sub goals	Important of sub goal N (%)	Method	Frequency (%)	Govt.	Private	P-value
	Yes, 96 (99%)	RICE PRINCIPLE	93 (95%)	28	65	0.193
Reduce Swelling	No, 1 (1.0%)	Massage	27 (27.8%)	8	19	0.918
		Oedema	23 (23.7%)	7	16	0.849

		therapy/Lymphatic drainage			
		Active exercise therapy	37 (38.1%)	10	27	0.754
		Cooling	52 (53.6%)	16	36	0.0657
		Massage	36 (37.1%)	11	25	0.778
Pain relief	Yes, 94 (96.9%)	Electrotherapy	48 (49.4%)	11	37	0.201
	No, 3 (3.1%)	Ultrasound	51 (52.6%)	11	40	0.095
		Exercise therapy/ mobilization	35 (36.1%)	13	22	0.179
		Posture advice	27 (27.8%)	9	18	0.546
		Use of leg drawer	16 (16.5%)	5	11	0.818
	Yes, 95 (97.9%)	Passive exercise therapy, manual	64 (66.0%)	15	49	0.100
Improve mobility	No, 2 (2.1%)	Passive exercise therapy, CPM	68 (70.1%)	20	48	0.856
		Active exercise therapy	66 (68.1%)	24	42	0.017
	Yes, 92 (94.8%)	Treadmill	43 (44.6%)	13	30	0.791
Improve gait pattern	No, 5 (5.2%)	All kinds of walking exercises/ walking forms	81 (83.5%)	24	57	0.709
		Electrotherapy	18 (18.6%)	3	15	0.491
Improve muscle strength	Yes, 96 (99.0%)	Exercise therapy, Closed chain	72 (74.2%)	16	46	0.014
	No, 1 (1.0%)	Exercise therapy, open chain	69 (71.1%)	23	56	0.127
		Bridging Tummy tucking	47 (48.4%)	15	32	0.617
Improve core stability	Yes, 75 (77.3%)	Isometrics Kneeling exercises	23 (23.8%)	10	13	0.586
	No, 22 (22.7%)	Gluteal and quadriceps exercises	17 (17.6%)	8	9	0.491
		Trunk stability Therapy ball exercises	10 (10.3%)	5	6	0.765
Total			97 (100%)			

Table III: returning to sport recommendation after TKA

Variables	Frequency (%)
Do you recommend sport after TKA?	
Yes	83 (84.7%)
No	14 (14.3%)
Which type of sport activities?	
Swimming	57 (58.2%)
Walking	70 (71.4%)
Table tennis	34 (34.7%)
Cycling	68 (69.4%)
Hiking	21 (21.4%)
Riding	28 (28.6%)
Volleyball	23 (23.5%)
Running	37 (37.8%)
Dancing	19 (19.4%)
Basketball	18 (18.4%)

Discussion

This study sought to determine the current methods of physical therapy rehabilitation and understand the differences between physical therapist rehabilitation in the private and public sectors, as well as their recommendations for returning to sports activities following knee arthroplasty. Our current survey suggests that 99% physical therapists followed RICE principal for reduction of swelling after TKA, but the new studies conducted by Yongming, L et al., tells the evidence that after total knee arthroplasty, using elastic thigh compression stockings for 14 days would cause patients' edema to decrease by 2 cm and their pain to diminish while some studies also suggested that elevation of lower limb can also reduce swelling after knee arthroplasty in early stages and it also helps patients to recover soon.[16]

This study suggested that cooling was applied by most (53%) of physical therapists in order to reduce pain after TKA. However, recent literature review conducted by Bistolfi et al, in 2016 suggests that cooling can be applied only at 2nd day after TKA and cooling or cryotherapy has no such clinical effects.[17,18]

According to current studies, continuous passive mobilizer (CPM) mostly applied for mobility improvement, while Boese, C. K et al.., conducted a study in 2018 which shows that prolong use of CPM have only short term effect on Patient Mobility due to shorter duration of patient's stay in hospital after TKA, so use of CPM in recovery after Total knee arthroplasty has no such benefits.[19] Among total, 84.5% respondents showed that all kinds of walking exercises are beneficial to improve gait pattern, in contrast Jaczewska et al, conducted a study in 2018 which show that Proprioceptive Neuromuscular Facilitation (PNF) techniques are more important than all others physiotherapy protocols in order to improve gait pattern after total knee arthroplasty. The duration of the stance phase, the gait cycle, and the gait duration were all reduced by PNF, while the swing phase velocity, the gait velocity, the cadence, the step length, and the gait cycle length were all increased. Also, there was clearly reduced postoperative discomfort.[20]

Majority of Physical therapists in current survey followed Closed chain exercise therapy to Quadriceps muscle strength, but Klika et al, conducted a Randomized control trial in 2022 which doesn't supports this response of physiotherapists, contradictory findings suggest that other interventions like NMES (neuromuscular electric stimulation) technique can only applied for Quadriceps strengthening. Mistry et al, conductive a Review in 2022 which shows that use of a home-based application-controlled NMES therapy system in rehabilitation resulted in statistically much increases in quadriceps

strength following total knee arthroplasty, indicating that these patients would be able to return to their normal activities more quickly.[21,22]

Among total, 77.3% of physical therapist in our survey marked core stability as an important rehabilitation goal and this is supported by Warner et al., conducted a study in 2020 which shows that core stability programs are more important in physical therapy rehabilitation for TKA patients. The functional outcome of core stability rehabilitation training in total knee replacement patients can be Core training is superior to standard physical therapy exercises, as evidenced by a discernible difference on the lower extremity functional scale. Therefore, it may be included in a patient's treatment plan if they have a total knee replacement. Exercises for core stability strengthen the muscles in the trunk and hip muscles, thereby strengthening of core muscles is important and affects recovery after TKA.[23] The current study reveals that rehabilitation practices for physiotherapists treating patients after total knee arthroplasty (TKA) were consistent across both government and private tertiary hospitals. However, there is no existing literature to either support or refute this finding from the current study.

Regarding recommendation of sports after total knee arthroplasty, 83/97 physical therapist in current research recommended activities after TKA, this recommendation is supported by Witjes et al., in his systemic Review and Meta Analysis conducted in 2016 which shows that all low and high impact sports are possible even up to 100% after TKA but depending upon the pre-operative physical activities of the patient.[24] Hiking, swimming and cycling as low impacts activities are recommended by 57, 68, and 21 out of 97 physical therapist respectively, Oehler et al., conducted a study in 2016 resulted that these types of low impacts activities are possible following TKA.[25]

Current research stated that, high impact activities like volley ball, running or jogging and basketball are recommended by less of populations that enrolled, this is supported by O'Malley, M. J et al.., conducted a study in 2018 which shows that these type high activities should be avoided after joint arthroplasty ,After a knee arthroplasty, returning to sports is conceivable, but it seems more likely after uni-condylar arthroplasty than after total knee arthroplasty, especially for higher-impact activities.[22,26]

Limitations

A small sample size of 97 physical therapists from tertiary care hospitals of Peshawar were targeted for data collection. Some of the basics important variable that are flexibility exercises, stretching, mobilization, strengthening pelvic floor muscles and other muscles around knee were missing in our questionnaire. Due to ongoing SARS-COV2 pandemic, most of the respondents were not willing to provide data.

Recommendations

It is recommended that physical therapists should update their information and advance their knowledge of protocols regards TKA rehabilitation in order to provide better protocols to efficiently treat their patients. Some of rehabilitation goals like flexibility exercises, stretching, mobilization and strengthening of other muscles around knee and pelvic floor muscles strengthening should be counted in further study tools. Furthermore, it is also recommended by the researcher to conduct an in-depth study on a larger scale on provincial level in order to screen the variations in physiotherapy treatment of TKA and provide best solution for the provision of evidence-based protocols.

Conclusion

The current study revealed that, the delivery of rehabilitation for treating total knee arthroplasty patients by physical therapists varied in most of the aspects regarding reduction of swelling, pain relief, improvement of patients' mobility, patient gait pattern, muscle strength improvement and core stability after replacement surgery. Rehabilitation phases and patient assessment pre- and post-surgical interventions by physical therapists are not properly applied

according to the evident guidelines. However, recommendations of sports for an individual athlete after arthroplasty procedure performed are somewhat similar and same with the guidelines provided by recent and updated research. There is no existed variation in rehabilitation of total knee arthroplasty in govt or private hospital.

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