Research Article

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# Skin Sensitivity to Pressure and Kneeling Ability Before and After TKA

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## Abstract

*The kneeling ability and sensitivity to pain tested in 30 consecutive patients undergoing primary TKAs, Thirty (30) knees (16 right, 14 left). Kneeling difficulties following TKA were noticed in the majority of patients. Before surgery, the PPTs (Pain Pressure Thresholds) measures were lower in the patients who were unable to kneel compared to those who were able to kneel. However, this difference was not significant at QT (Quadriceps Tendon) area (p=0.2) but significant in all other areas (P= < 0.05). At 6 months the values were changed but again the differences were not significant (p=> 0.05). There were notable gender differences in the kneeling ability before and after TKA.*

## Hypotheses

There is no difference in kneeling ability before and after TKA. Post-Operative skin sensitivity to pressure limits the kneeling ability following TKA. Sensory changes after TKA have no effect on the kneeling ability of patients.

## Introduction

One of the most frequently asked questions by patients undergoing TKA concerns their post-operative mobility, specifically their ease of kneeling. Full functionality of the knee is reduced following TKA, potentially making kneeling difficult which, leads to patient dissatisfaction reviewed the available literature to investigate the functional range of motion requirements of Asian and the Middle Eastern populations [1-3]. The study reported that the majority of daily activities require a high level of flexion in the knee to allow actions such as squatting, kneeling or sitting with both legs crossed. The study revealed that the need for flexibility in the knee joint of Western populations is lower than that in Asian and Middle Eastern populations.

The authors reported that studies which report the range of flexion in the knee and hip are inadequate and have provided inconsistent data. The authors suggested a 130° range of motion in the hip and 111°-165° or more degrees of flexion in the knee for squatting. Likewise, sitting with the legs crossed requires a 90°-100° range of motion in the hip and 111°-165° or more degrees of flexion in the knee. The study concluded that the poor description of measurement techniques and methodology weakens the validity of any findings in this field of study. In this study pre and post-operative assessments of kneeling ability employed qualitative and quantitative data collection techniques. These included the assessment of AKP, range of motion and the extent of sensory changes following TKA.

## Patients and Methods

### Ethical Considerations

The study received the R&D approval from the NHS Health Research Authority - NRES Committee Yorkshire and the Humber - Leeds West; and from NHS Lothian.

### Patient Selection

Patients undergoing primary TKAs in the Royal Infirmary of Edinburgh –NHS Lothian, were invited to take part in the study. Thirty 30 knees (16 right, 14 left) of 30 consecutive patients attending the pre-assessment clinics of six different consultants were given a detailed information sheet and included in the study after they had signed a consent form (They were the same patients of chapter 5). The patients were reviewed in the follow-up clinic 6 months after surgery. In all patients an anterior midline skin incision was used for the surgery and the knee replacement used was a single radius implant design (Triathlon- Stryker). The patella was not resurfaced. Exclusion criteria include

1. Rheumatoid arthritis
2. History of knee surgery on the same knee
3. Steroid or analgesic injection interventions for the knee pain in the last 6 months.

### Study Design

### Kneeling Ability

In the pre-operative assessment clinic, the patient's ability to kneel (before surgery) was recorded. More specifically, the patients were asked about their ability to kneel. They were then asked to demonstrate kneeling on a firm surface if able to do so, and to record the importance of kneeling during their daily activities. Four images of the different kneeling positions were used to facilitate communication and ensure an understanding of what was meant by the term "kneeling" Figure 1. The patients who were unwilling or unable to kneel were asked to explain the reason (knee pain, back

or hip stiffness, anxiety, etc.) and this was recorded.

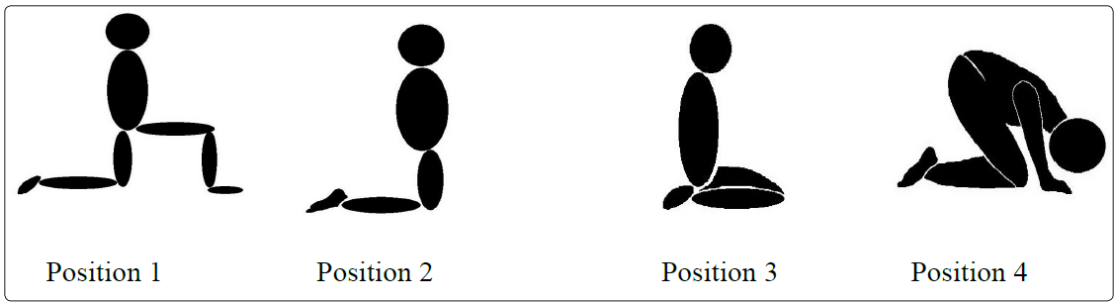


**Figure 1:** Kneeling images showing different kneeling positions (P1, P2, P3, P4)

## Sensitivity to Pain

### Apparatus

A dolorimeter (also known as an algometer) was used to test Pre-op and Post-op sensitivity to pain. The Dolorimeter Figure 2 used was a pain threshold meter model PTH-AF2, commercially available through the Pain Diagnostic and Treatment Corporation (Great Neck, NY 11021, USA). The device is a force gauge fitted with a disc shape tip bearing a surface of exactly 1cm2.The range of gauge is 3-30kg (6-66 LBS); all readings are expressed as kilograms per square centimeter (Kg/cm$^2$)

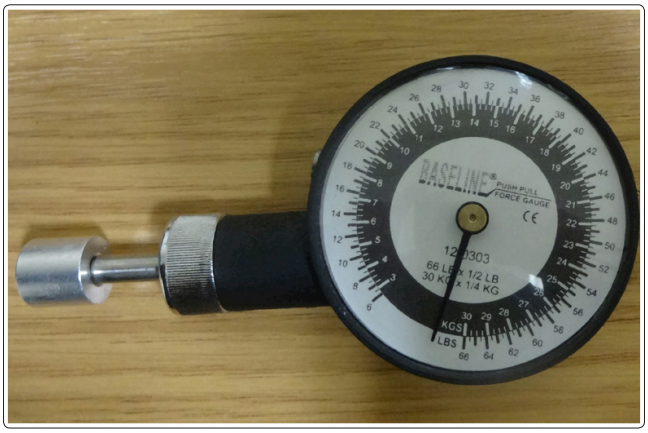

**Figure 2:** Baseline Dolorimeter (Algometer) with a circular probe

### Protocol

A previously described standard method for studying patients was followed in this research [4-6].

### This consisted of:

- Information was given to each patient explaining the purpose and the method used for the clinical assessment of pain sensitivity (stimulation of deep tissue receptors).
- The patient was positioned supine with a pillow under the knee.
- The applicator tip, (which was 1cm square, but had a rounded profile) was applied 3 times on different areas of the knee at a slow steady rate perpendicular to the area with 30 seconds between applications. The average of the 3 readings recorded.
- The patient was instructed to respond verbally ('Yes') as soon as the sensation of pressure became painful (Onset of Pain).

The areas tested include the Quadriceps Tendon area (QT), Mid-Patellar area (MP), Patellar Tendon area (PT), and the anterior fibers of the Deltoid in the normal shoulder (i.e. the anterior surface between the shoulder and upper arm), as a control area [7, 8]. The Photographic AKP map was used for communicating and recording the results Figure 3 [8].

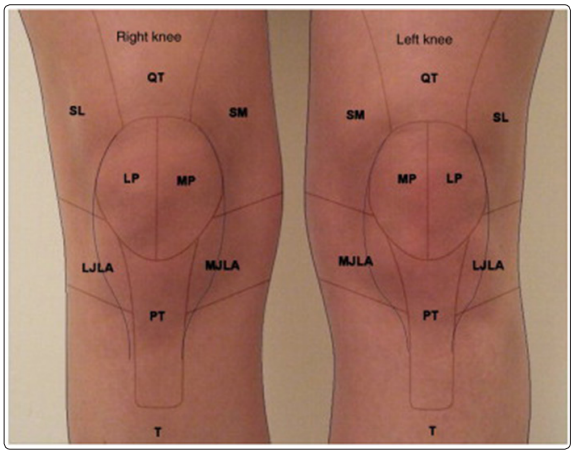


**Figure 3:** PAKP Map-Photographic AKP Map [9].

The knee areas indicated with the help of the photographic AKP map. The dolorimeter was used to record the pain sensitivity in kilograms in those areas (2-3 cm from the edge of the patella). Six months after the surgery (1) the kneeling ability, (2) the pain threshold, (3) the range of motion and (4) the grades of sensory changes on the knee Table 1 were recorded.

**Table 1: Grading of sensation of pinprick and light touch testing (Hassaballa, Artz et al. 2012)**

| Sensory grade | Definition | Terminology |
|---|---|---|
| -2 | Absent sensation to pin-prick/light touch | Anaesthesia |
| -1 | Diminished sensation to light touch | Hypoesthesia |
| | Blunt sensation to pin prick | |
| 0 | Normal sensation | Normal |
| +1 | Abnormal but tolerable sensation to pin- | Sensitive |
| | Prick/light touch | |
| +2 | Marked/unbearable sensation to pin-prick/ | Hypersensitive |
| | Light touch | |

SPSS version 21.0 used for data analysis. Descriptive statistical analysis of kneeling ability and patterns of kneeling before and

after TKA, data were expressed as numbers (%) or mean±SD. The measurement of means of 'onset of pain' sensitivity records before surgery and 6 months after were compared using the t- test; a P-Value of <0.05 was considered significant.

## Results

Table 2 shows the demographics of TKA patients selected for the study.

**Table 2: Shows the demographics of TKA patients selected for the study**

| Demographics | | Values (SD) |
|---|---|---|
| Age (y) | | 70.1(9.2) |
| Gender | | 20(F), 10(M) |
| Height (m) | | 1.62 (0.101) |
| Weight (kg) | | 81.2 (17.173) |
| Body mass index (kg/m$^2$) | | 31.62 (5.281) |
| Diagnosis | | OA |
| Involved Knee | Left | 14 |
| | Right | 16 |

Table 2: Demographics of participants (n=30)

## Pre-Operative Kneeling Ability and Patterns of Kneeling

Thirty patients (under the care of six different consultants) were seen in preoperative assessment clinics. Their mean age was 70.1 years ±9.2 and most were women (n=20). They were tested for their kneeling ability before TKA and sequentially recruited until there were15 patients able to kneel and 15 patients unable to kneel. The only kneeling pattern which was impossible for every patient even in the 'able' to kneel group was the P4 kneeling position. The most common kneeling positions were upright kneeling positions P1 (7 patients) and P2 (7 patients). Only one female patient was able to kneel with fully flexed knees-P3 without any difficulty Figure 4. The specific advice on kneeling was given to only 4 patients. 26 patients reported that no advice was given to them by any healthcare professionals. 21 patients considered kneeling to be an important function. 9 patients reported that this function was not important for them. Knee pain was the main reason behind difficulties relating to kneeling inability in 50% of patients (15 out of 30).

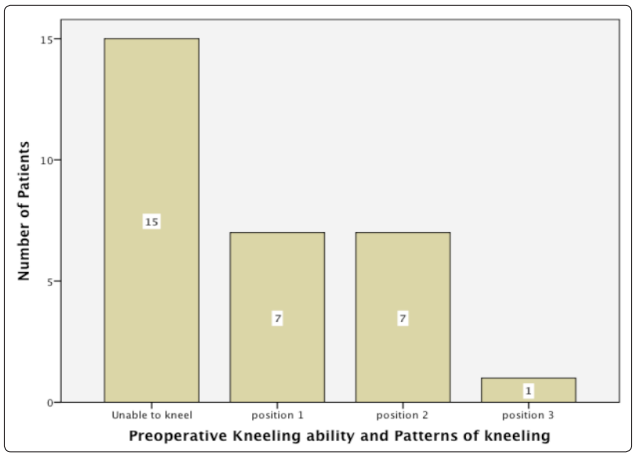


**Figure 4:** Kneeling ability and Patterns of Kneeling before TKA (15 patients able to kneel)

Out of the 20 females involved in this study only 6 were able to kneel prior to surgery. 9 males out of 10 were able to kneel prior to surgery Table 3.

**Table 3: Relationship between Preoperative Kneeling Ability and Gender of TKA Patients (P= 0.002)**

| | | Preoperative Kneeling Ability | | Total |
|---|---|---|---|---|
| | | Able to kneel | Unable to kneel | |
| Gender | Male | 9 | 1 | 10 |
| | Female | 6 | 14 | 20 |
| Total | | 15 | 15 | 30 |

## Post-Operative Kneeling Ability and Patterns of Kneeling

Among the 27 patients who completed the study, 21 patients were unable to kneel and 6 patients were able to kneel 6 months after the surgery Figure 5. As with the pre-operative findings, the P1 and P2 were the most common positions of kneeling post-operatively. The female patient, who was able to kneel with fully flexed knees (P3 Position) before the surgery was unable to attain this kneeling position 6 months after TKA.

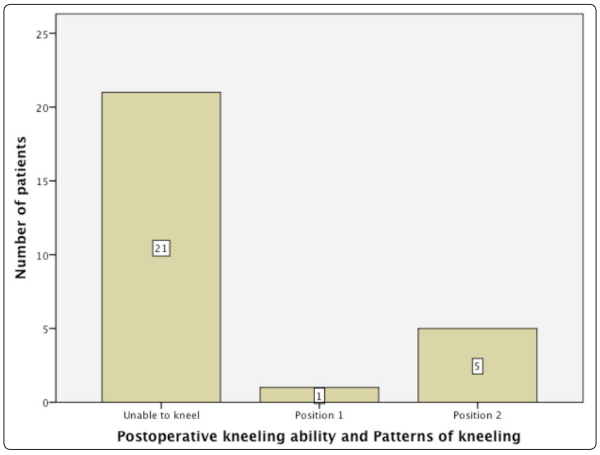


**Figure 5:** Kneeling ability and Patterns of Kneeling after TKA (6 patients were able to kneel)

The post-operative kneeling ability in males (3/10-30%) was greater compared with female patients (3/17-17%). This was true for the pre-operative kneeling ability both in males (9/10-90%) and females (6/20-30%) Table 4.

**Table 4: Relationship between Post-Operative Kneeling Ability and Gender of TKA Patients (P=0.4)**

| | | Preoperative Kneeling Ability | | Total |
|---|---|---|---|---|
| | | Able to kneel | Unable to kneel | |
| Gender | Male | 3 | 7 | 10 |
| | Female | 3 | 14 | 17 |
| Total | | 6 | 21 | 27 |

A significant relationship was observed between the pre-operative and postoperative kneeling ability; Pearson Correlation=0.5 (P =0.003).

Among the reasons behind the inability to kneel, the knee pain was the main reason before and after TKA. 15 patients before TKA, 13 patients after TKA, moreover; after TKAs 7 patients did not want to kneel due to feelings of anxiety, and one patient referred to other joint problems.

### Anterior Knee Pain Assessment Before and After TKA

The area that was perceived to be most painful before TKA was the medial joint line (MJLA) for 21 patients and the lateral joint line area (LJLA) for 9 patients. After 6 months the most painful area was the lateral joint line area (LJLA) for 13 patients, MJLA for another 13 patients and Mid-patellar area for only one patient.

### Pressure Pain Tolerance on the Surface of the Knee Joint:

The means of the Pain Pressure Thresholds (PPTs) from QT (quadriceps Tendon) area, MP (Mid-Patellar) area, PT (Patellar Tendon) area and normal deltoid area (Control) for all the patients able to kneel and the patients unable to kneel PRE-operatively and POST-operatively were statistically analyzed for comparison.

Before surgery, the PPTs measures were lower in the patients who were unable to kneel compared to those who were able to kneel. However, this difference was not significant at QT area (p=0.2) but significant in all other areas (P= < 0.05).

At 6 months the values were changed but again the differences were not significant (p=>0.05) (Figures 6 and 7).

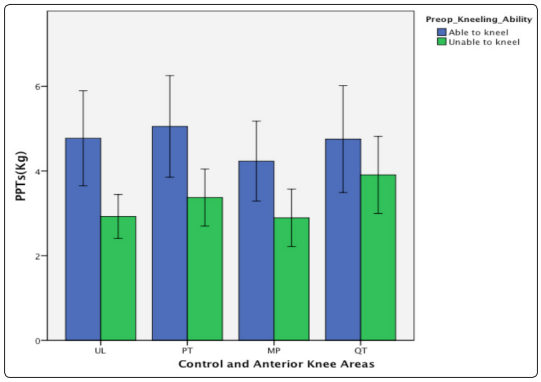


**Figure 6:** The mean PPTs measures and kneeling ability before TKA

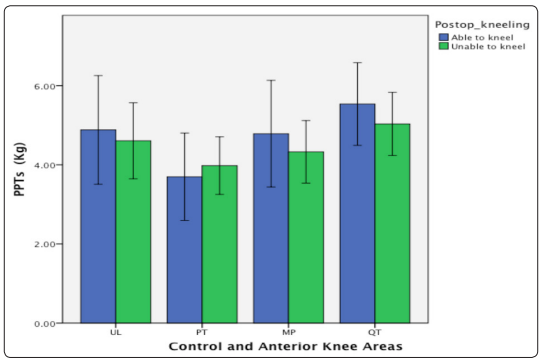


**Figure 7:** The mean PPTs measures and kneeling ability after TKA

Further analysis of the relationship between the PPTs and the kneeling ability in groups of TKA patients, identified according to their kneeling ability before and after TKA (see appendix 1): Group (1); patients who were able to kneel before and after TKA (n=6), Group (2); patients who were unable to kneel before and after TKA (n=13), and Group (3); patients who were able to kneel before TKA and unable to kneel after TKA (n=8). The mean changes of each patient's PPT in the control and knee areas after TKA was analyzed (POSTPRE) in the 3 groups of TKA patients defined immediately above Figure 8. Group1 (n=6): there was an Increase of PPTs after TKA in all areas but that increase was only significant at UL and QT areas (P=0.03, P=0.02 respectively).

Group 2 (n=13): there was a significant increase of PPTs at UL area (P= 0.03), insignificant decrease at PT area (P= 0.4), and also insignificant increase of PPTs at MP and QT areas (P=0.3, P=0.1 respectively). Group 3(n=8): there was insignificant increase of PPTs at UL and MP areas (P=0.5, P=0.8), and insignificant decrease of PPTs at PT and QT areas (P=0.1, P=0.8).

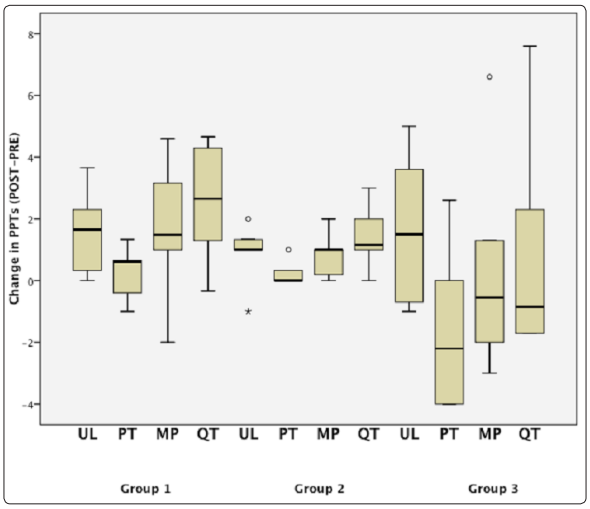


**Figure 8:** The mean changes of PTTs in the 3 groups of TKA Patients (Group 1-able to kneel before and after TKA, Group 2- unable to kneel before and after TKA, Group 3- able to kneel before TKA and Unable after TKA)

### Sensory Changes and Kneeling Ability after TKA

Hypoesthesia (grade -1) and anesthesia (grade -2) were the sensory disturbances on the distal and lateral side of the knee joint 6 months after the surgery for all patients (n=27) Table 5. The sensory changes in both groups of patients showed no significant relationship to the kneeling ability (P =0.6, chi square test).

**Table 5: Kneeling Ability and Sensory Changes 6 months after TKA**

| | | Preoperative Kneeling Ability | | Total |
|---|---|---|---|---|
| | | Able to kneel | Unable to kneel | |
| Postop Sensation | Anaesthesia | 4 | 12 | 16 |
| | Hypoesthesia | 2 | 9 | 11 |
| Total | | 6 | 21 | 27 |

### Knee ROM after TKA

The mean ROM following TKA was 96°. Patients who were able to kneel had ROM from 90° to 110° while patients who were unable to kneel had ROM from 80° to 110°. The difference was not significant, P=0.08.

## Discussion

A differential factor in this study is that all patterns of kneeling were incorporated in the results. This study corresponds with that of, which reported that the ability to kneel was hindered post operation [10]. This study highlighted several factors that might be a cause of kneeling difficulties after TKA.

Total Knee Arthroplasty, although not able to restore full knee flexion, can improve the range of joint motion of pre-operative osteoarthritis patients. Previous studies demonstrated that the procedure can make the action of kneeling easier this is not the case in this current study as 77% were unable to kneel postoperatively, whereas the groups were recruited to ensure that 50% could kneel preoperatively [11, 12]. Recognized the inability to kneel following TKA surgery was due to multiple contributory elements [13]. Acknowledge that in-depth studies of TKA post-operative patients were inadequate [14]. Schai observed knee flexion and reported in postoperative patients that the observed flexion was greater than their perceived ability following the TKA procedure. The current research study expressed the reality of kneeling before and after TKA.

Findings of this study may be affected by the patients being afraid of doing post-operative damage and therefore their perceived performance of knee joint flexion may be under-represented with approximately 50% of patients unable to kneel. This present study indicated that the pre-operative and postoperative kneeling ability differed depending on gender, with males being able to kneel more frequently than females. Therefore, a further study on gender differences is justified.

Where a restriction in movement was noticed, the underlying issues were generally scar pain or issues associated with back related problems [14]. It is interesting to note that 72% of a group of preoperative patients who were informed about how kneeling would be affected by the surgery found no issues with kneeling one year after TKA.

Employed a survey that was taken bi-annually by up to 115 patients following TKA along with the Oxford Knee Score (OKS) survey [13]. They deduced that pain was not the only factor which affected kneeling; this assertion is in keeping with this present study. In another study, a total of one hundred knee replacements (75 patients) were assessed 6 months post operation for kneeling capability and pain levels. These were scored from one to ten [10]. Patients described why they were unable, or did not want to kneel. Again, perception of ability and actual ability were recorded. Patients were divided into two categories: those who were able to kneel without pain or with only mild pain and those who were unable to kneel due to pain. Thirty-two post-operative patients were able to kneel without noteworthy pain whereas fifty-four patients refused to kneel through fear of damage or pain. Sixty-four patients knelt without difficulty with mild to no pain recorded and only twelve failed to kneel due to unrelated ailments. The authors established that there was no significant distinction between the two groups based on the ability to kneel or not with regards to the range of motion in the joint and the overall knee score.

In the current study, kneeling difficulties following TKA were noticed in the majority of patients. The patient who was able to perform the high flexion kneeling pre-operatively failed to perform the same function following TKA and all of the patients who were able to kneel (6) performed kneeling on a knee or knees which had been operated on (P1 position& P2) following TKA. The changes in the ability to kneel (excluding 3 patients who refused to complete the study) were monitored in the 14 patients who were able to kneel and 13 patients were unable to kneel pre-operatively. Post-operatively 6 (23%) of the patients were able to kneel and 21 (77%) were unable to kneel after 6 months, thereby indicating no improvement in the kneeling function after TKA. This result was at variance with previous studies, which have reported an improvement in the kneeling ability following TKA [11, 12].

However, the different outcome in the results presented here compared to the study conducted by may be due to the sample selection which included randomly scheduled post-operative check-ups at an average of 40 months, different types of surgery which did not necessarily involve a full knee replacement and the specific action of kneeling asked about.

This study has investigated different types of kneeling. Upright Kneeling is the most frequently utilized method of kneeling after total replacements. A small number of previous studies involving Asian and Middle Eastern patients have focused on assessing a full knee flexion of achieving a kneeling position [15-17].

Have all documented up to 38% of post-operative cases who have experienced anteriorly located knee pain. However, this figure can be as low as 6.1%. The current study showed no distinct link between an awareness of pain and kneeling ability at six months after joint replacement [18-22]. The dolorimeter's records of the pain sensitivity before and after TKAs and the differences noticed in different areas of the anterior knee were not all significantly linked with the patients kneeling abilities; thus, although AKP remains one of the factors associated with the kneeling difficulty, the significance differences of PPTs recorded by the dolorimeter in different knee areas did not demonstrate a direct relationship between the kneeling function and pain pressure thresholds in all the three groups of patients. Although the number of patients in-group 1 (patients who were able to kneel before and after TKA) was small (n=6), but the result suggested an important link between the PPTs and the kneeling ability. The insignificant changes of PPTs in different areas of the knee could be due to smaller number of patients; most patients have no change or increase except for patient's in-group 3 in the PT area where their sensitivity to pain increases, so to confirm the results might need larger number of patients in each group.

Regarding the postoperative sensory changes over the anterior aspect of the knee this current study partially correlates with the findings of who performed a range of incisions in a group of 78 joint replacements [9]. There are three types of incisions used for TKA procedures. These are mid line, short medial and long antero-medial. They found that the larger the incision, the larger the zone of sensory alteration anterior to the joint post-surgery. Therefore, the longest type of incision had the greatest impact on the sensitivity of the surrounding area. Elevated sensitivity in the front part of the knee was concluded as being a factor that contributed to poor kneeling

performance. However, it is important to note that sensitivity can decrease over time [9].

The results showed that numbness following knee replacement, while common, is not significantly associated with poorer patient-reported outcomes. This concurs with a recent study by [23]. This study did, however, indicate a correlation between difficulty in kneeling and both patient-reported outcome measures (PROM) scores (WOMAC® pain subscale: 0.62 $p < 0.001$, KOOS: 0.64 ($p < 0.001$)) and self-reported measures. In a study conducted by, numbness was not found to affect functional outcomes following TKA [24]. This corresponds with the current study in which kneeling function and numbness were tested post-TKA. The participants in this study exhibited limited functional knee flexion. This is consistent with earlier studies which reported limits of flexion of 81° during ambulatory tasks and 90° when rising from a kneeling position [25-27]. These studies collectively indicate that the considerable effort invested in maximizing the range of knee motion that patients are able to achieve post-operatively has not yet resulted in patients being able to generate high ranges of flexion while performing functional activities.

Reported that a range of knee motion of less than 90° is required for the majority of daily activities. However, the demands of more active and younger patients are increasing the requirement for the optimization of functional outcomes from TKA [28]. An essential aspect of outcome that is widely discussed is TKA surgery that enables squatting, kneeling and participation in sport [14, 29-32]. These patients more so than others may be less satisfied with the outcome of their TKA by a functional knee flexion range which does not extend beyond 90°.This may limit the extent to which patients are able to participate in functional activities. Investigations to ensure that advances in enhancing the flexion range of motion following surgery can be translated into greater participation in high flexion functional activities, while not compromising prosthesis integrity are crucial if TKA surgery is to continue to meet the patients' requirements. This necessitates the identification of other factors that might restrict the range of knee flexion while performing functional activities.

Discrepancies in the results between this study and previous studies can also be accounted for by considering the differences in the protocols employed. For example, the kneeling ability and range of knee flexion following TKA can be dependent on the incisions used, while sample size and selection, patients' pain threshold and awareness and the follow-up period may also influence the results [33, 34].

## Conclusion

A patient's kneeling ability following TKA is related to their ability to kneel prior to TKA. Patients who were unable to kneel before TKA were not able to kneel following the surgery. There were notable gender differences in the kneeling ability before and after TKA. The dolorimeter is a useful instrument for quantitative assessment of the sensitivity to pressure pain in TKA patients. Numbness developed following a midline incision for TKA can be expected to improve with time but is not related to the kneeling ability.

**Appendix 1: PPTs measures before and after TKA in 3 groups of TKA patients, the mean difference of PPTs measures before and after TKA**

| Kneeling | | UL | | PT | | MP | | QT | |
|---|---|---|---|---|---|---|---|---|---|
| PRE | POST | PRE | POST | PRE | POST | PRE | POST | PRE | POST |
| 1.00 | 1.00 | 4.00 | 6.30 | 6.00 | 5.60 | 4.00 | 5.30 | 4.00 | 6.30 |
| 1.00 | 1.00 | 3.00 | 6.66 | 4.00 | 5.33 | 4.00 | 5.66 | 3.00 | 6.00 |
| 1.00 | 1.00 | 3.00 | 3.33 | 2.00 | 2.66 | 2.00 | 5.16 | 1.00 | 5.66 |
| 1.00 | 1.00 | 4.00 | 6.00 | 3.00 | 3.60 | 2.00 | 6.60 | 2.00 | 6.30 |
| 1.00 | 1.00 | 4.00 | 4.00 | 4.00 | 3.00 | 3.00 | 4.00 | 4.00 | 3.66 |
| 1.00 | 1.00 | 4.00 | 5.30 | 4.00 | 4.60 | 5.00 | 3.00 | 4.00 | 5.3 |
| 2.00 | 2.00 | 3.00 | 4.00 | 3.00 | 3.00 | 3.00 | 3.20 | 3.00 | 4.00 |
| 2.00 | 2.00 | 2.00 | 3.33 | 3.00 | 3.00 | 2.00 | 3.00 | 2.00 | 4.00 |
| 2.00 | 2.00 | 2.00 | 4.00 | 2.00 | 3.00 | 2.00 | 4.00 | 2.00 | 3.30 |
| 2.00 | 2.00 | 4.00 | 3.00 | 3.00 | 3.33 | 3.00 | 4.00 | 4.00 | 4.00 |
| 2.00 | 2.00 | 2.00 | 3.00 | 3.00 | 3.00 | 2.00 | 3.00 | 2.00 | 3.00 |
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| 2.00 | 2.00 | 2.00 | 3.33 | 2.00 | 3.33 | 2.00 | 6.60 | 2.00 | 5.00 |
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| 1.00 | 2.00 | 4.00 | 3.00 | 7.00 | 3.00 | 6.00 | 3.00 | 5.00 | 4.00 |
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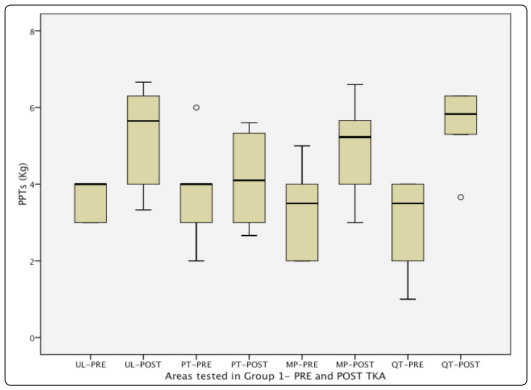
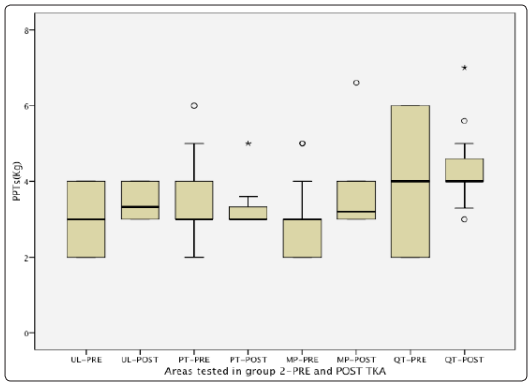
| 1.00 | 2.00 | 6.00 | 9.60 | 7.00 | 5.30 | 6.00 | 4.00 | 8.00 | 6.30 |
| 1.00 | 2.00 | 4.00 | 3.00 | 5.00 | 3.00 | 4.00 | 3.00 | 6.00 | 3.00 |
| 1.00 | 2.00 | 11.00 | 7.00 | 9.00 | 9.60 | 6.00 | 7.30 | 10.00 | 6.30 |
| | | | | | | | | | |
| 1.00 | | 7.00 | | 4.00 | | 4.00 | | 4.00 | |
| 2.00 | | 1.00 | | 2.00 | | 1.00 | | 2.00 | |
| 2.00 | | 3.00 | | 3.00 | | 5.00 | | 6.00 | |

The Dolorimeter records (Kg), Group 1=Yellow-able to kneel before and after TKA, Group 2=Green-unable to kneel before and after TKA, Group 3=Blue- able before and unable after TKA, violet =missed patients. Kneeling ability 1=Able to kneel, 2=Unable to kneel.



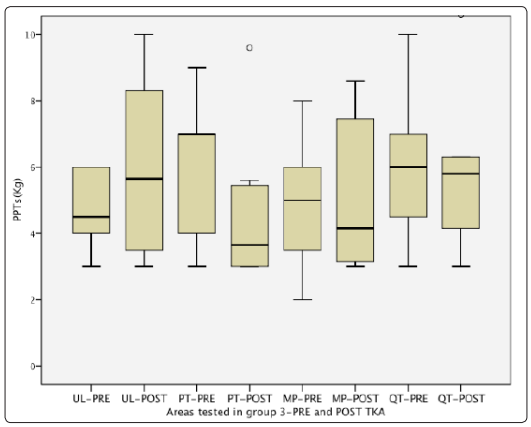




**Table 1: PPTs mean difference in Group 1- Patients able to kneel before and after TKA (n=6)**

| Mean Difference (POST-PRE) | | P-Value |
|---|---|---|
| UL | 1.5 | 0.03 |
| PT | 0.2 | 0.4 |
| MP | 1.6 | 0.1 |
| QT | 2.5 | 0.02 |

**Table 2: PPTs mean difference in Group 2- Patients Unable to kneel before and after TKA (n=13)**

| Mean Difference (POST-PRE) | | P-Value |
|---|---|---|
| UL | 0.55 | 0.03 |
| PT | 0.26 | 0.4 |
| MP | 0.72 | 0.1 |
| QT | 0.46 | 0.3 |

**Table 3: PPTs mean difference in Group 3- Patients able to kneel before TKA and unable after TKA (n=8)**

| Mean Difference (POST-PRE) | | P-Value |
|---|---|---|
| UL | 0.61 | 0.5 |
| PT | -1.4 | 0.1 |
| MP | 0.26 | 0.8 |
| QT | -0.23 | 0.8 |

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