

THE EFFECT OF FEAR OF MOVEMENT ON WALKING SPEED IN PATIENT WITH TOTAL KNEE ARTHRITIS

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KEYWORDS

Fear of Movement, osteoarthritis, total knee replacement, walking speed, physical activity. 4 meter walk test.

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Abstract

Background

Osteoarthritis is a chronic degenerative joint disorder characterized by progressive cartilage loss, joint stiffness which results in limitation of daily activities. Increased severity of the condition

Osteoarthritis is a chronic degenerative disorder which results in limitation of daily activities. Obesity, sedentary lifestyle and lack of exercise result in poor wear & tear of the joint. Failure in conservative management Severity of the condition Conservative fails with increased severity of the condition. TKA is most widely performed surgical procedures with advanced OA knee. Post-surgery, patients experience pain, swelling, reduced confidence & fear while movement, which in turn affects might affect restoration of functional movement.

METHOD

The aim of the study is to correlate / find the relationship between fear of movement & affects walking speed in patients with Total Knee Arthroplasty / Total Knee Replacement.

RESULT

32 subjects Males and females aged 55-75 years were included in the study. Patients with cognitive impairment or any with h/o neurological disorders were excluded.

Outcome measure Tampa Scale of Kinesiophobia , 4 meter walk test were the outcome measures used.

CONCLUSION

The study resulted concluded that there is a relationship between fear of movement and walking speed in patients with TKR. Increase in fear of movements results in reduced walking speed in patients with Total Knee Arthroplasty.

Introduction

Total knee arthroplasty (TKA), commonly known as total knee replacement, is one of the most widely performed and effective surgical procedures for patients with advanced knee osteoarthritis.(1)(2) Osteoarthritis is a chronic degenerative joint disorder characterized by progressive cartilage loss, pain, stiffness, deformity, and limitation of daily activities.(3) When conservative management such as medication, physiotherapy, lifestyle modification, and intra-articular injections fail to provide adequate relief, total knee replacement becomes an important treatment option. ((4)The primary goals of TKA are to relieve pain, correct deformity, improve joint alignment, restore mobility, and enhance overall quality of life.(6)

Although TKA provides marked improvement in pain and function for many patients, the post-operative recovery period is complex and influenced by several physical, psychological, and social factors.(7)(8)

Physical performance after TKA can be affected by pain intensity, quadriceps weakness, reduced knee flexion and extension, poor balance, altered gait pattern, and decreased endurance. (9)Performance-based tests such as the Timed Up and Go test provide useful information about actual mobility and functional capacity. Unlike self-reported measures, performance-based assessment reflects how efficiently the patient can perform real-life movement tasks.(10)

Surgical success alone does not guarantee complete functional recovery. Patients must actively participate in rehabilitation, perform prescribed exercises, regain knee range of motion, improve muscle strength, and gradually return to functional activities such as walking, standing from a chair, stair climbing, and balance-related tasks. (11)(12)(13)

The early post-operative period is especially important because it lays the foundation for long-term recovery. During this phase, patients commonly experience pain, swelling, stiffness, muscle inhibition, reduced confidence, and fear while initiating movement. (14)(15)These factors may limit participation in physiotherapy and delay the restoration of functional independence. Therefore, understanding the determinants of early

physical performance after TKA is essential for planning effective rehabilitation strategies.(16)

- The number of TKA procedures is increasing due to aging population, obesity, lifestyle changes, and the rising prevalence of osteoarthritis.
- Recovery of physical function is an important outcome after TKA and can be measured through patient-reported outcomes and performance-based outcomes.
- Patient-reported outcomes may not fully reflect actual physical performance because pain, fear, and psychological responses can influence the patient's perception of recovery.

Pain catastrophizing is another major psychosocial factor that may influence recovery. Patients with high pain catastrophizing tend to focus excessively on pain, expect the worst possible outcome, and feel unable to control their symptoms.(17) (18)This negative pain-related thinking can increase perceived pain intensity, reduce confidence, and interfere with active participation in rehabilitation.(22)(24) As a result, catastrophizing may indirectly affect mobility and functional performance after surgery.

The relationship between kinesophobia, pain catastrophizing, and physical performance is clinically relevant because these factors may interact with each other.(27) Pain may increase fear of movement; fear of movement may reduce activity; reduced activity may lead to weakness and stiffness; and catastrophizing thoughts may further intensify the pain experience.(28) This cycle can slow down rehabilitation progress and affect the patient's confidence in returning to daily activities.(29)

The compensatory gait mechanics commonly observed are proposed to be a mechanism to minimize weight-bearing pain on the affected joint.(30) Joint mechanics in this population have been extensively characterized and investigated in relation to OA and accompanying symptoms. However, it is unclear whether the OA-specific gait mechanics that are commonly linked to severity and symptoms, may also be related to the ability of this population to be physically active.(31)

NEED OF STUDY

Total knee replacement is commonly performed to reduce pain and improve mobility in patients with advanced knee osteoarthritis. However, successful surgery alone does not ensure complete functional recovery. During the early post-operative period, patients may experience pain, swelling, stiffness, reduced muscle strength, and fear while performing movements such as walking, standing, turning, and climbing stairs. Psychological factors such as effect of fear of movement may negatively influence rehabilitation participation. Patients who are afraid of movement may avoid exercises and weight bearing activities, while patients with catastrophic thoughts about pain may perceive movement as harmful or unsafe. These responses can delay recovery and reduce physical performance even when surgical healing is satisfactory.

Research Question To investigate the effect of fear of movement on walking speed in patient undergone total knee replacement surgery

HYPOTHESIS

NULL HYPOTHESIS(H0)-There is no significant relation of fear of movement, walking speed physical performance in patient with total knee replacement

ALTERNATIVE HYPOTHESIS (H1)-there is significant relation of fear of movement, walking speed physical performance in patient with total knee replacement

OBJECTIVE

- To assess the effect of fear of movement and walking speed physical performance
- To assess the relationship between fear of movement and walking speed physical performance

MATERIALS AND METHODOLOGY

RESEARCH DESIGN: Cross sectional study

SAMPLE DESIGN: Purposive sampling method.

STUDY POPULATION: total knee replacement.

SAMPLING SIZE: The study has been done on Sixty two (n=62) Subjects.

SAMPLING METHOD: Samples were chosen by observing the inclusion and Exclusion criteria.

INCLUSION CRITERIA

- Age group 55 to 75 years.
- Undergone total knee replacement

- Patient who are advice to walk post-surgery

EXCLUSION CRITERIA

- Cognitive impairment
- Malignancy
- Neurological disorder
- Récent fracture
- Post psychological disorder

OUTCOME MEASURES

1. Tampa scale of kinesiophobia -Tampa scale of kinesiophobia is a 17 item scale each response range from 4- strongly agree 3-agree 2-disagree 1-strongly disagree Least score is 17 and go up-to 68. increases scores reflect and increased fear of movement. It is valid and reliable scale to evaluate fear of movement in patient and is readily available. 56

2. 4 meter walk test- measure 4 meter central testing zone with extra 1 meter zones at the start for acceleration and at the end for deceleration. instruct the patient to walk the path at their normal, comfortable pace. divide 4 meter by the time in seconds. low risk- greater than 1.0m/s, moderate risk-0.8m/s to 1.0m/s, high risk-less than 0.8 m/s.

PROCEDURE

After obtaining written consent and selecting patients based on inclusive and exclusive criteria, patient are selected Frequency -POD 14- 17 Duration – 20- 30 min Test used- scales –

1. Tampa scale of kinesiophobia- It is a 17 item scale each response range from 4- strongly agree 3 agree 2-disagree 1-strongly disagree Least score is 17 and go up-to 68.

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DATA ANALYSIS

Summary of all numerical parameters Minimum Maximum Mean Std. Dev. Median Quartile Age 50.00 74.00 57.73 6.73 55.50 6.00 POD 14.00 17.00 15.34 1.02 15.00 1.00 VAS 1.00 9.00 4.60 2.12 4.50 1.50

The study cohort comprised patients with a mean

age of 7.73 ± 6.73 years, all assessed at a uniform post-operative period of 15.34 ± 1.02 days. On average, patients reported moderate pain levels (VAS: 4.60 ± 2.12) and moderate fear of movement (31.31 ± 8.80), indicating that while pain and psychological barriers were present, they were not extreme in most cases. Functional mobility, as measured by the Timed Up and Go test (TUG: 11.34 ± 2.85 seconds), reflected generally good physical performance, though the range of 7.5–17.5 seconds indicates that some individuals required considerably more time and may need targeted rehabilitation

DISCUSSION

Demographic Profile The demographic findings showed that the mean age of participants was 57.73 ± 6.73 years, with the majority belonging to the 50–54 years age group (41.94%). Females (54.84%) were slightly more represented than males (45.16%). This distribution is consistent with previous studies, as osteoarthritis and the need for total knee replacement are more commonly seen among older adults and females due to degenerative joint changes, hormonal influences, and reduced bone density. Additionally, most participants had co-morbidities such as diabetes mellitus (72.58%) and hypertension (64.52%), which may influence post-operative recovery outcomes.

Pain, Psychological Factors and Functional Performance The mean pain score measured by VAS was 4.60 ± 2.12 , indicating moderate pain levels in the early post-operative phase. Similarly, the mean effect of movement score was 31.31 ± 8.80 , reflecting a moderate level of fear of movement among participants. The Pain Catastrophizing Scale (PCS) mean score of 14.37 ± 11.12 showed notable variability, indicating that while some patients had low levels of catastrophic thinking, others experienced considerably higher psychological distress. Functional performance measured by the Timed Up and Go (TUG) test showed a mean value of 11.34 ± 2.85 seconds, suggesting relatively acceptable mobility with considerable variation among individuals.

Correlation Findings

LIMITATIONS

- The study was conducted on a limited sample size of 62 patients, which may limit generalization of the findings to a larger population.
- The study was limited to patients following total

knee replacement from a single clinical setting, which may affect wider applicability of the results.

- Psychological factors were assessed using self-reported questionnaires, so responses may have been influenced by patient understanding, mood, pain level, and willingness to report symptoms accurately.
- Other factors such as muscle strength, range of motion, analgesic use, social support, and rehabilitation adherence were not studied in detail.

RECOMMENDATIONS

- Future studies should be conducted with a larger sample size to improve the reliability and generalizability of the findings.
- Longitudinal studies are recommended to assess changes in effect of movement, pain catastrophizing, and physical performance at different stages of recovery after total knee replacement.
- Multicentre studies may be useful to include patients from different hospitals and rehabilitation settings.
- Routine screening for effect of fear should be considered during early post-operative physiotherapy assessment.
- Patient education, reassurance, graded exposure to movement, confidence-building exercises, and counselling strategies should be integrated with conventional physiotherapy rehabilitation. Further research may include additional physical parameters such as knee range of motion, quadriceps strength, gait pattern, balance, and rehabilitation adherence to understand recovery more comprehensively.

CONCLUSION

The present study concludes that pain catastrophizing, effect of movement and physical performance are significantly related in patients following total knee replacement. The results indicate that recovery after total knee replacement is not influenced only by surgical healing and physical rehabilitation, but also by the patient's psychological response to pain and movement. Fear of movement and negative pain-related thoughts can reduce confidence, limit participation in physiotherapy, and affect functional mobility during the early post-operative phase. The findings showed that higher pain intensity was associated with greater fear of movement and pain catastrophizing. This suggests that patients who experience more pain may develop increased fear

of movement and may also tend to think more negatively about their pain. These psychological responses may further increase avoidance behaviour, reduce exercise performance, and slow down functional recovery. A strong positive relationship was observed between fear of movement and Timed Up and Go test scores, indicating that patients with higher fear of movement required more time to complete the functional mobility task. This reflects poorer physical performance and highlights the importance of addressing fear of movement during the early rehabilitation period. Similarly, pain catastrophizing was also significantly associated with delayed mobility, showing that negative pain-related thinking can influence functional outcomes after surgery.

Key Conclusions

- A strong positive correlation was observed between fear of movement and Timed Up and Go (TUG) scores, indicating that patients with greater fear of movement demonstrated poorer physical performance.

- Pain catastrophizing was significantly associated with delayed mobility, suggesting that psychological distress may act as a barrier to effective rehabilitation.

Overall Interpretation
Overall, the study demonstrates that psychological factors are important contributors to early post-operative recovery after total knee replacement. Patients who show higher levels of fear, worry, and catastrophic thinking may be more likely to avoid movement, delay weight-bearing activities, and perform poorly in functional mobility tasks. Therefore, psychological screening should be considered as an important part of post-operative physiotherapy assessment. The study also supports the need for patient education during the early post-operative period. Patients should be reassured that controlled and guided movement is safe, necessary, and beneficial for recovery. Education regarding pain, healing, exercise importance, and expected recovery pattern may help reduce fear,

improve confidence, and encourage active participation in rehabilitation. **Clinical Relevance**
The results highlight the importance of addressing both physical pain and psychological factors during the early post-operative phase. Early assessment of fear of movement can help identify patients at risk of delayed recovery. Incorporating psychological counselling, reassurance, and cognitive-behavioural strategies along with conventional physiotherapy may improve patient confidence, enhance mobility, and promote better functional outcomes. **Implications for Physiotherapy Practice**
Physiotherapists should not focus only on pain reduction, range of motion, strengthening, and gait training, but should also identify psychological barriers such as fear of movement and pain catastrophizing. A rehabilitation programme that includes graded exposure to movement, functional task practice, reassurance, goal setting, and patient motivation may help improve physical performance in patients after total knee replacement. Early recognition of patients with high fear of movements can help in planning individualized treatment strategies. Such patients may benefit from additional counselling, repeated explanation of exercise safety, gradual progression of activities, and close monitoring of functional improvement. This approach can help prevent delayed recovery and improve independence in daily activities.

Final Conclusion: The present study highlights that fear of movement are important psychological factors associated with poorer physical performance in patients following total knee replacement. A multidisciplinary rehabilitation approach focusing on pain control, physical recovery, patient education, confidence building, and psychological support is essential for optimizing recovery, improving functional mobility, reducing fear of movement, and enhancing quality of life after total knee replacement.

Table 1: Age and Gender wise distribution of participants

Factor	No. of participants	% of participants
Age group		
50–54 years	26	41.94
55–59 years	15	24.19
60–64 years	7	11.29
≥65 years	14	22.58

Mean	57.73	
SD	6.73	
Gender		
Male	28	45.16
Female	34	54.84
Total	62	100.00

Table 2: Co-morbidities wise distribution of participants

Co-morbidities	No. of participants	% of participants
Diabetes mellitus		
No	17	27.42
Yes	45	72.58
Hypertension		
No	22	35.48
Yes	40	64.52
Total	62	100.00

Table 3: BI/UNI wise distribution of participants

BI/UNI	No. of participants	% of participants
Unilateral	29	46.77
Bilateral	33	53.23
Total	62	100.00

Table 4: POD wise distribution of participants

POD	No. of participants	% of participants
16	25.81	
15	18	29.03
16	19	30.65
17	9	14.52
Total	62	100.00

Table 5: Summary of all numerical parameters

Parameters	Minimum	Maximum	Mean	Std. Dev.	Median	Quartile
Age	50.00	74.00	57.73	6.73	55.50	6.00
POD	14.00	17.00	15.34	1.02	15.00	1.00
VAS	1.00	9.00	4.60	2.12	4.50	1.50
Kinesiophobia	15.00	52.00	31.31	8.80	30.50	7.00
PCS	0.00	37.00	14.37	11.12	11.00	9.50
TUG	7.50	17.50	11.34	2.85	10.10	2.15

The study cohort comprised patients with a mean age of 57.73 ± 6.73 years, all assessed at a uniform post-operative period of 15.34 ± 1.02 days. On average, patients reported moderate pain levels (VAS: 4.60 ± 2.12) and moderate fear of movement (kinesiophobia: 31.31 ± 8.80), indicating that while pain and psychological barriers were present, they were not extreme in most cases. However, the Pain Catastrophizing Scale (PCS: 14.37 ± 11.12) showed the greatest variability, suggesting that while most patients had low catastrophizing scores, a distinct subset exhibited markedly higher negative pain-related thinking. Functional mobility, as measured by the Timed Up and Go test (TUG: 11.34 ± 2.85 seconds), reflected generally good physical performance, though the range of 7.5–17.5 seconds indicates that some individuals required considerably more time and may need targeted rehabilitation.

Table 6: Normality of VAS, Kinesiophobia, PCS and TUG scores by Shapiro-Wilk test

Parameters	Shapiro-Wilk	df	p-value
VAS	0.9560	62	0.0260*
Kinesiophobia	0.9640	62	0.0640
PCS	0.9090	62	0.0001*
TUG	0.9040	62	0.0001*

* $p < 0.05$. The scores of VAS, kinesiophobia, PCS and TUG did not follow normal distribution according to the Shapiro-Wilk test. Therefore, non-parametric tests were applied.

Table 7: Correlation between VAS with Kinesiophobia, PCS and TUG by Spearman rank correlation

Variables	N	Spearman R	t-value	p-value
Kinesiophobia	62	0.4986	4.4559	0.0001*
PCS	62	0.5505	5.1079	0.0001*
TUG	62	0.7229	8.1043	0.0001*

* $p < 0.05$. Spearman rank correlation analysis revealed that pain intensity, measured by the Visual Analogue Scale (VAS), showed statistically significant positive correlations with kinesiophobia, Pain Catastrophizing Scale (PCS), and Timed Up and Go (TUG) test scores in all 62 patients. The strongest correlation was observed between VAS and TUG ($r = 0.7229$, $p < 0.0001$), indicating a robust association between higher pain levels and slower functional mobility. VAS also demonstrated a moderately strong positive correlation with PCS ($r = 0.5505$, $p < 0.0001$), while the correlation between VAS and kinesiophobia was moderately positive ($r = 0.4986$, $p < 0.0001$).

Table 8: Correlation between Kinesiophobia with PCS and TUG by Spearman rank correlation

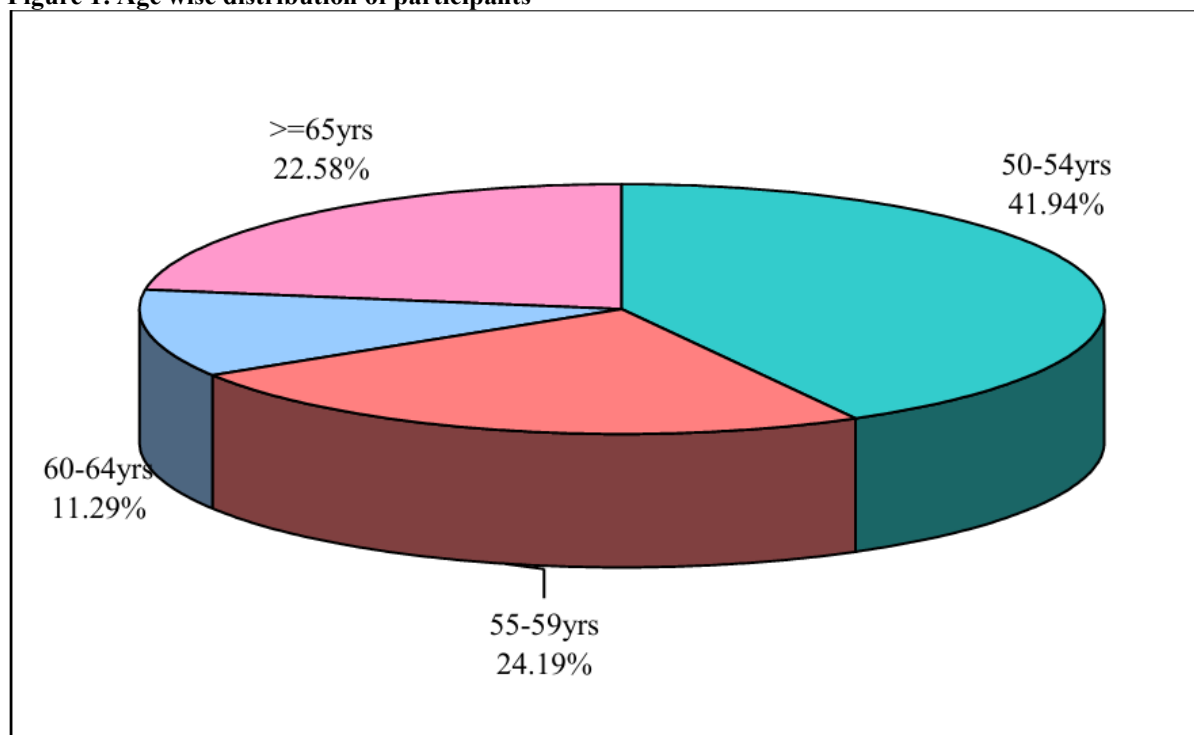
Variables	N	Spearman R	t-value	p-value
PCS	62	0.6296	6.2768	0.0001*
TUG	62	0.7734	9.4497	0.0001*

* $p < 0.05$. Spearman rank correlation analysis revealed statistically significant positive correlations between kinesiophobia and both PCS and TUG. A very strong positive correlation was observed between kinesiophobia and TUG ($r = 0.7734$, $p < 0.0001$), indicating that patients with greater fear of movement had slower physical performance on the Timed Up and Go test. Kinesiophobia also showed a moderately strong positive correlation with PCS ($r = 0.6296$, $p < 0.0001$), demonstrating a close association between fear of movement and pain catastrophizing.

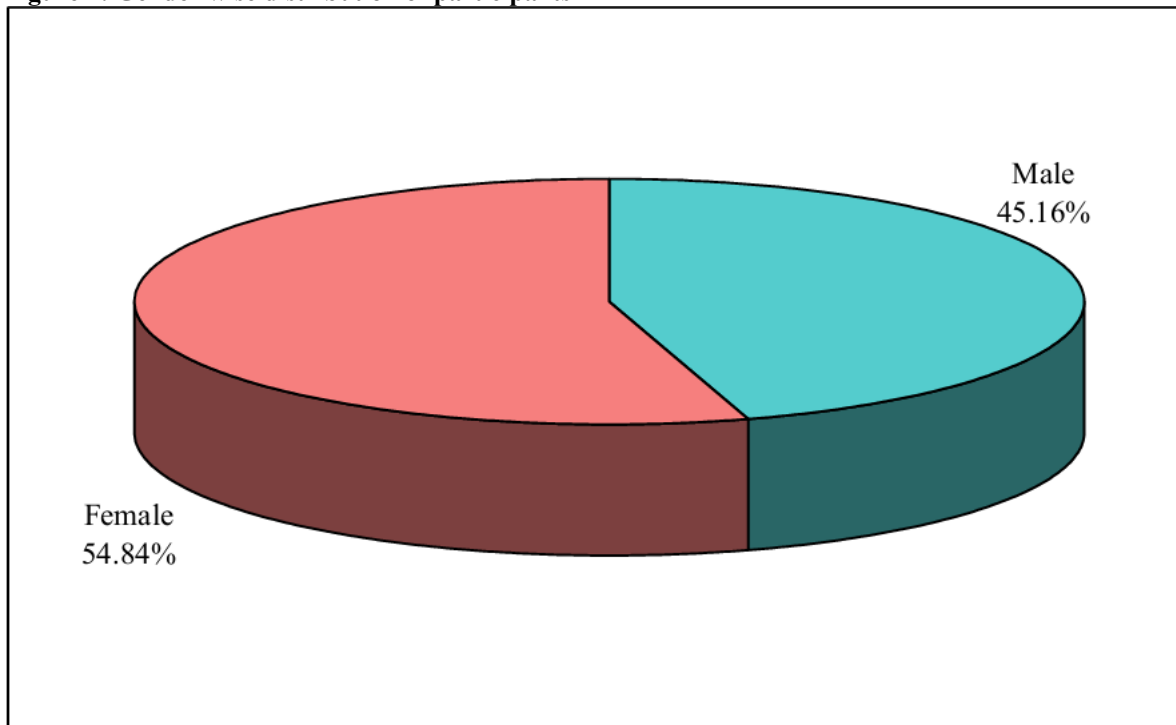
Table 9: Correlation between PCS with TUG by Spearman rank correlation

Variables	N	Spearman R	t-value	p-value
TUG	62	0.5792	5.5039	0.0001*

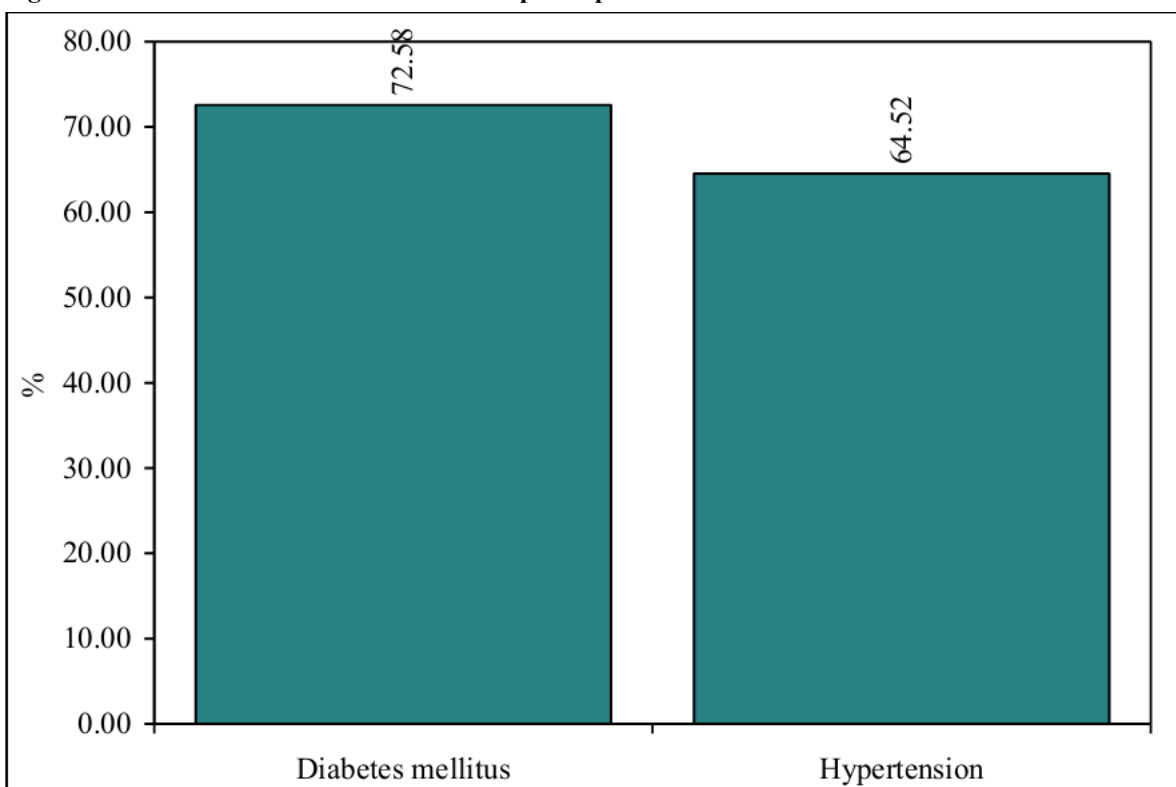
* $p < 0.05$. Spearman rank correlation analysis showed a statistically significant positive correlation between PCS and TUG ($r = 0.5792$, $p < 0.0001$), indicating that patients with higher pain catastrophizing scores tended to take longer to complete the Timed Up and Go test, reflecting poorer physical performance. This moderate-to-strong correlation was highly significant, confirming that the association is unlikely to be due to chance.

Figure 1: Age wise distribution of participants

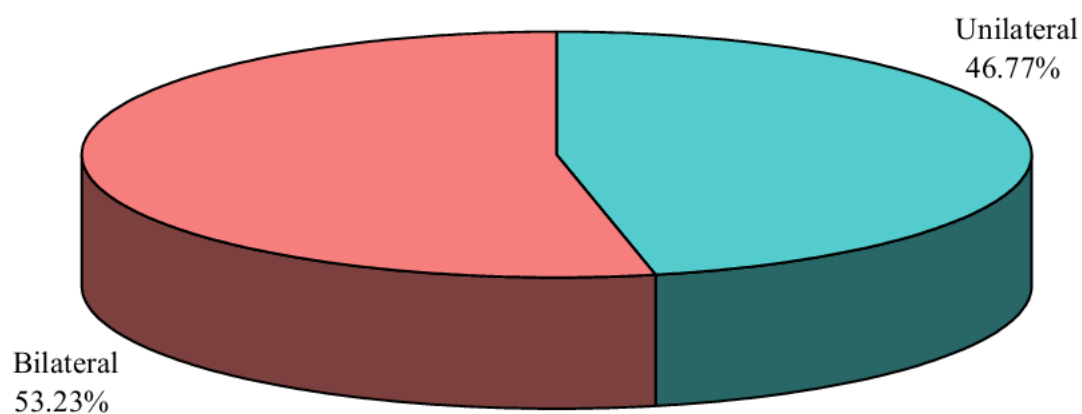
50-54 years: 41.94%; 55-59 years: 24.19%; 60-64 years: 11.29%; ≥65 years: 22.58%.

Figure 2: Gender wise distribution of participants

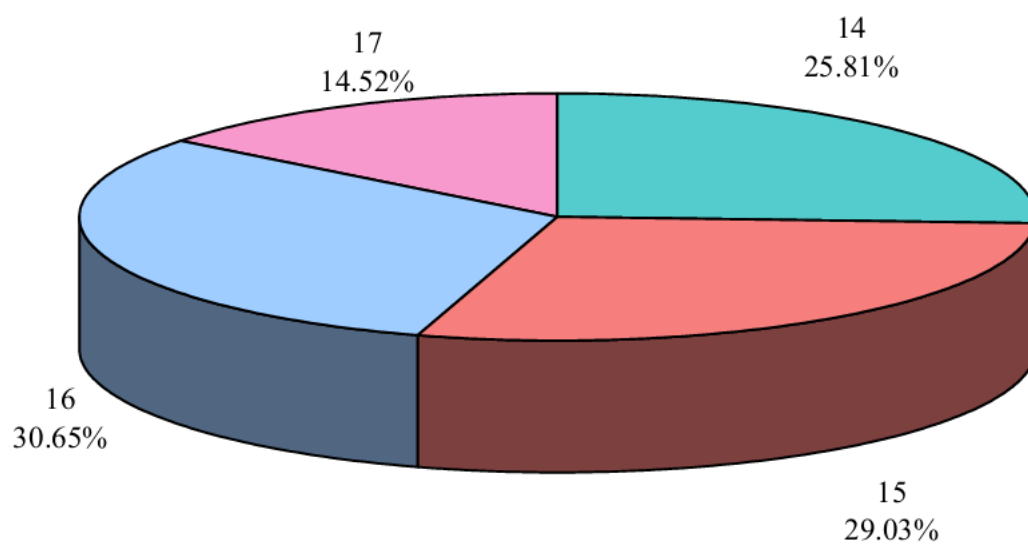
Female: 54.84%; Male: 45.16%.

Figure 3: Co-morbidities wise distribution of participants

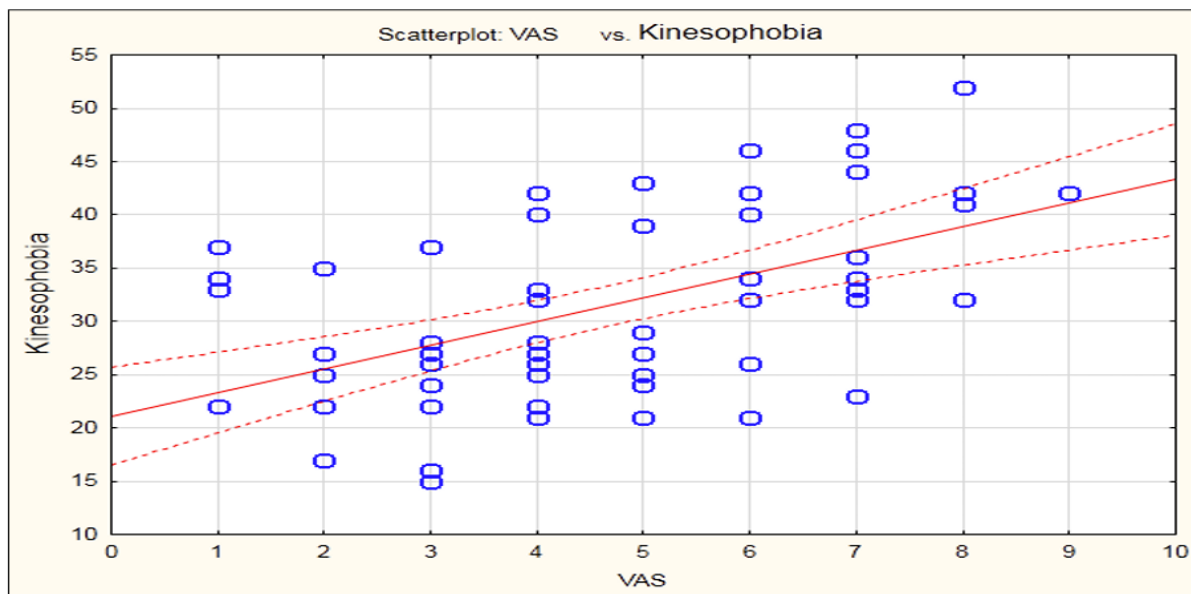
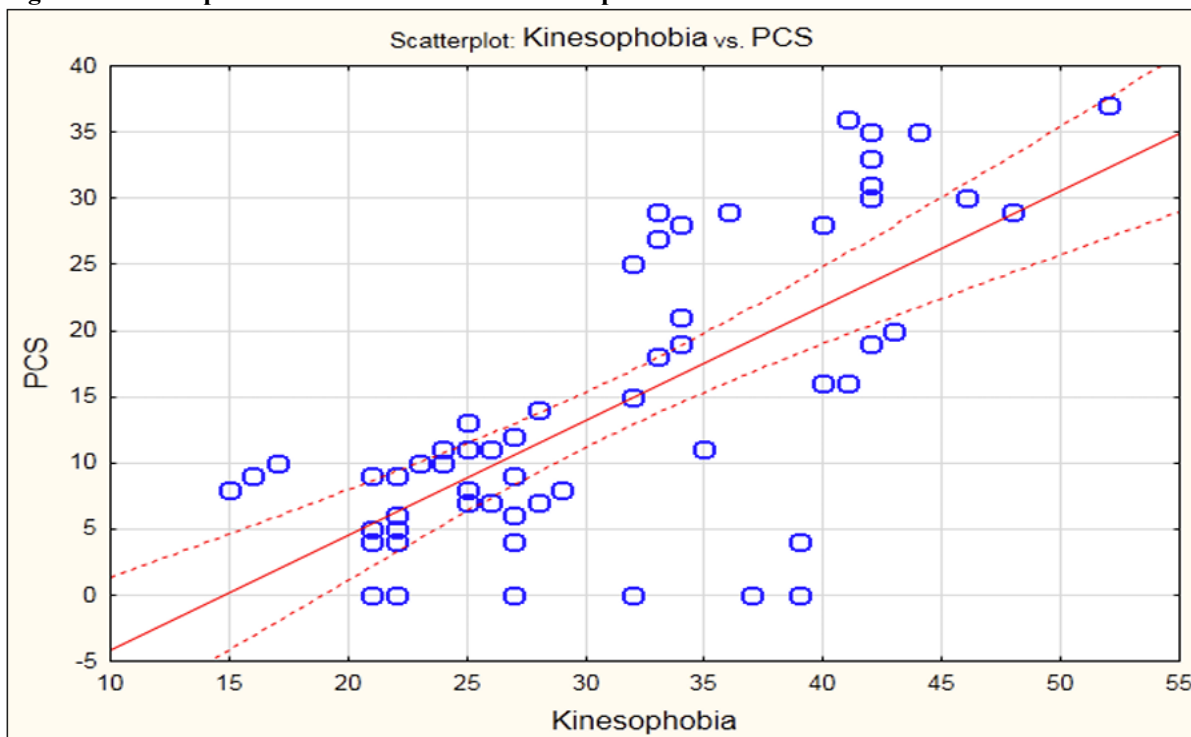
Diabetes mellitus: 72.58%; Hypertension: 64.52%.

Figure 4: BI/UNI wise distribution of participants

Bilateral: 53.23%; Unilateral: 46.77%.

Figure 5: POD wise distribution of participants

POD 14: 25.81%; POD 15: 29.03%; POD 16: 30.65%; POD 17: 14.52%.

Figure 6: Scatter plot of correlation between VAS with Kinesiophobia, PCS and TUG**Figure 7: Scatter plot of correlation between Kinesiophobia with PCS and TUG**

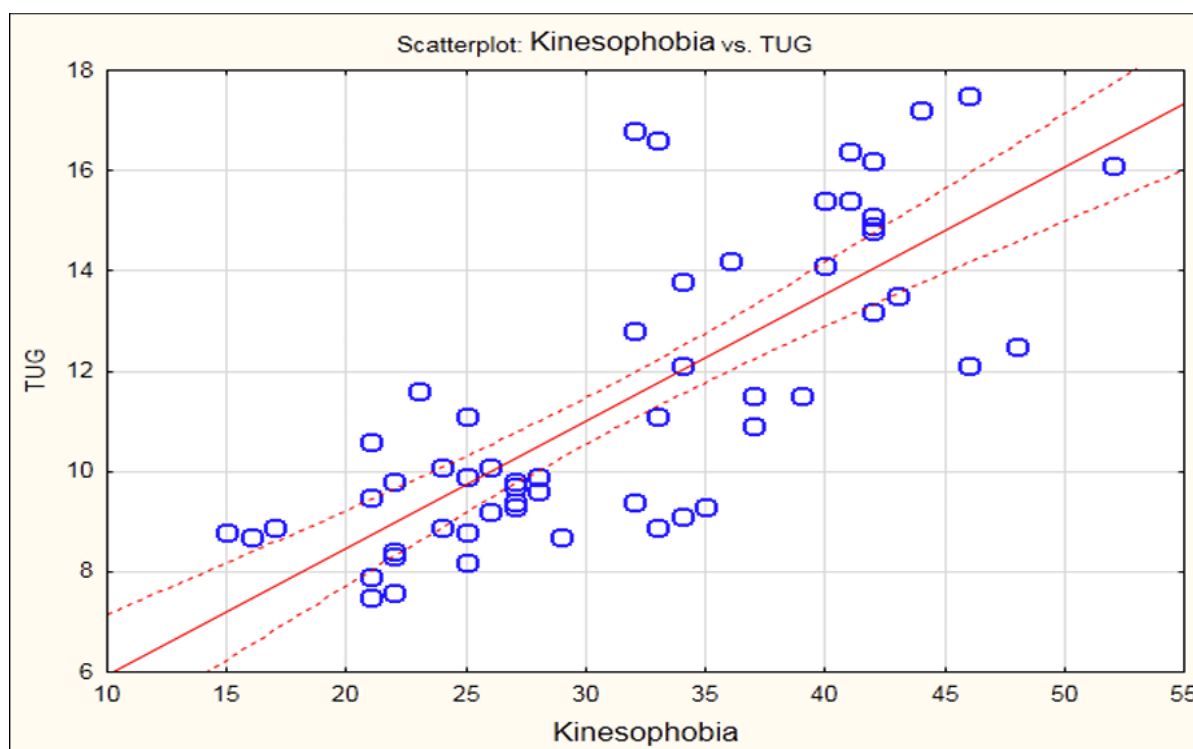
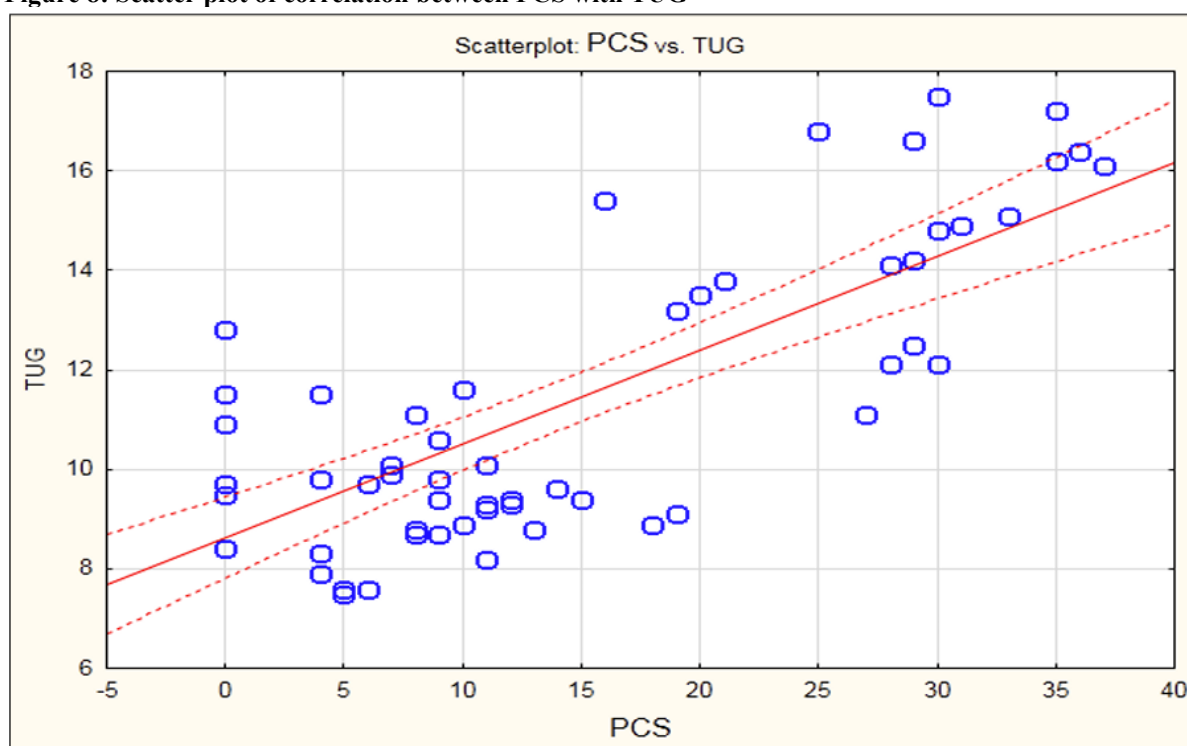


Figure 8: Scatter plot of correlation between PCS with TUG



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