



IS THE CONVENTIONAL KELLGREN–LAWRENCE GRADING SYSTEM STILL RELEVANT FOR ASSESSING KNEE OSTEOARTHRITIS?

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ABSTRACT

Background: Posterior tibia slope (PTS) and Metaphyseal diaphyseal angle (MDA) of knee joint tend to increase as the Osteoarthritis (OA) advances. These angles are being used in planning knee surgeries like Arthroscopy and Arthroplasty. Clinicians across the world rely on the Kellgren Lawrence (KL) grading system for knee osteoarthritis to evaluate disease severity and anticipate the likelihood of requiring knee replacement surgery. In this work, we studied the correlation of PTS and MDA with varying grades of knee OA with reference to the (KL) Grade to know whether KL grading can still be used in Out-patient clinics. There is limited published evidence exploring this correlation.

Methods: This was a descriptive cross-sectional study conducted over a period of 18 months involving 76 patients over 40 years of age with knee pain showing radiological degenerative changes. Osteoarthritis of knee was graded as per the KL grading. PTS and MDA were calculated from radiographs of the knee joint. The correlation of these parameters with the Kellgren and Lawrence classification of OA and with each other was assessed.

Results: Osteoarthritis (KL Grade) was distributed equally across grades 1, 2, 3, and 4, with 19 cases (25.00%) in each grade. Mean MDA was $22.24 \pm 1.61^\circ$. Mean MDA was highest in grade 4 ($24.25 \pm 0.91^\circ$), followed by grade 3 ($22.84 \pm 0.64^\circ$), grade 2 ($21.45 \pm 0.57^\circ$), and lowest in grade 1 ($20.41 \pm 0.6^\circ$), with significant difference among grades (p value < 0.0001). Mean PTS was $12.43 \pm 1.66^\circ$. Mean PTS was highest in grade 4 ($14.59 \pm 0.79^\circ$), followed by grade 3 ($12.83 \pm 0.6^\circ$), grade 2 ($11.83 \pm 0.77^\circ$), and lowest in grade 1 ($10.46 \pm 0.61^\circ$), with significant difference among grades (p value < 0.0001). A significant, very strong positive correlation was seen between MDA and PTS and each of them with KL grading of osteoarthritis for knee ($P < 0.0001$).

Conclusions: Both PTS and MDA showed a statistically significant progressive increase with KL grading for OA of knee. The mean PTS and MDA values were found to increase consistently from KL Grade 1 to Grade 4, indicating a strong association between these anatomical parameters and the progression of degenerative changes in the knee joint. This indicates KL grade can still be used as clinical tool to assess OA of knee.

Keywords: Posterior Tibia Slope (PTS), Metaphyseal Diaphyseal Angle (MDA), Osteoarthritis, Anterior Cruciate Ligament (ACL).

INTRODUCTION

Since 1957, when the original article was published, orthopedic surgeons have been using Kellgren Lawrence (KL) grading successfully as a quick clinic tool to assess osteoarthritis of the knee.^[1] As we evolved and started to understand geometry of the articular surface of tibia in a better way various measurements like posterior tibial slope (PTS) and

metaphyseal diaphyseal angle (MDA) are being used. Recently, many authors have suggested that both PTS and MDA can be used as a better predictor for development of knee osteoarthritis (OA).^[2,3,4]

PTS is a determinant of altered joint biomechanics. PTS is essential both for ligament function and knee kinematics. Increased PTS has been linked with Anterior Cruciate Ligament (ACL) rupture and ACL reconstruction failure.^[5] It's a well-known fact that around half of the individuals who have ACL tear will have Osteoarthritis of knee in 10-12 years.^[6] Individuals who do not have ACL injury but have greater PTS angles are also at a greater risk of developing common or accelerated knee OA than



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those with a neutral posterior tibial slope.^[7] When PTS is high, the tibial shear force and anterior tibial translation also significantly rise. An increase in medial tibial slope may cause anterior cruciate ligament strain and injuries. The increase in PTS with osteoarthritic degeneration has been shown in many other studies also.^[8,9] According to an Indian study the mean PTS among the normal group was found out to be 9.69° and among the arthritic group, it was 14.05.^[10]

MDA is a recent radiological entity gaining clinical significance. Not many studies have been done globally on the clinical importance of MDA. It is the angle made between the longitudinal axis of the tibia and the axis of the proximal tibial metaphysis in a lateral view. The clinical importance of MDA is that it affects the mechanical axis in the sagittal plane by bringing the center of the knee backwards.^[2] While doing total knee replacement MDA affects the accuracy of the extramedullary jig used for achieving the PTS and the PTS achieved intraoperatively.^[3] The slope is an important consideration in knee biomechanics, modification of radiological techniques, and surgeries such as high tibial osteotomy for genu recurvatum deformity, tibiofemoral osteoarthritis, and knee arthroplasty. Previous studies have concluded that PTS and MDA show higher values in the osteoarthritic group, and they also have a moderate correlation between them. They also serve as a marker in detecting arthritis with good sensitivity and specificity.^[2,3,4,8,9,10] Though PTS and MDA are good predictors of OA and are a good tool to advise and plan total knee arthroplasty, measuring them is time consuming. In this work, we tried to find correlation between PTS, MDA and increasing KL grades of OA seen on standard knee radiographs. This helped us in finding out whether KL grading can still be used in the outpatient settings to quickly diagnose and give prognosis or we should entirely switch to geometric measuring.

Study Objective

To study correlation of PTS and MDA with varying Kellgren Lawrence grading of OA knee in Indian population

MATERIALS AND METHODS

This was a “descriptive cross-sectional” study conducted over a period of 18 months involving patients over 40 years of age with knee pain showing radiological degenerative changes. The sample size was 76. Patients with secondary osteoarthritis, intra-articular fractures of the knee joint, ligamentous injury of the knee, severe osteoporosis, or tumors were excluded from the study. X-rays with anteroposterior and lateral views were examined. Prior to beginning this study, Institutional research and ethical board clearance was taken.

Osteoarthritis Grading of knee according to Kellgren Lawrence

OA was graded as per the Kellgren Lawrence classification, which was defined in 1957 and consists of four grades based on osteophyte formation, joint space narrowing, sclerosis, and bone deformity.^[1]

The grading was done from least severity to high severity, with grade 1 being least severe with very little or doubtful joint space narrowing and slight possible formation of osteophytes, whereas grade 2 was labelled when there was possible joint space narrowing with definite formation of osteophytes. Further, grade 3 showed definitive narrowing of the joint space with a moderate level of formation of osteophytes with some bone deformity and sclerosis, while grade 4 was the most severe, with large osteophytes and severe joint space narrowing with definite bone deformity and marked sclerosis.

Radiological measurements of PTS and MDS were done as follows^[2]

Line no. 1- The line connecting midpoints of outer cortical diameter at 5 and 15 cm distal to the knee joint (anatomical axis of tibia).

Line no. 2- Line drawn “perpendicular to the anatomical axis of the tibia”.

Line no. 3- The third line is formed by joining the most proximal points on the tibia plateau on the lateral radiograph.

The angle formed between lines 2 & 3 is the PTS^[2] This is shown in Figure 1.

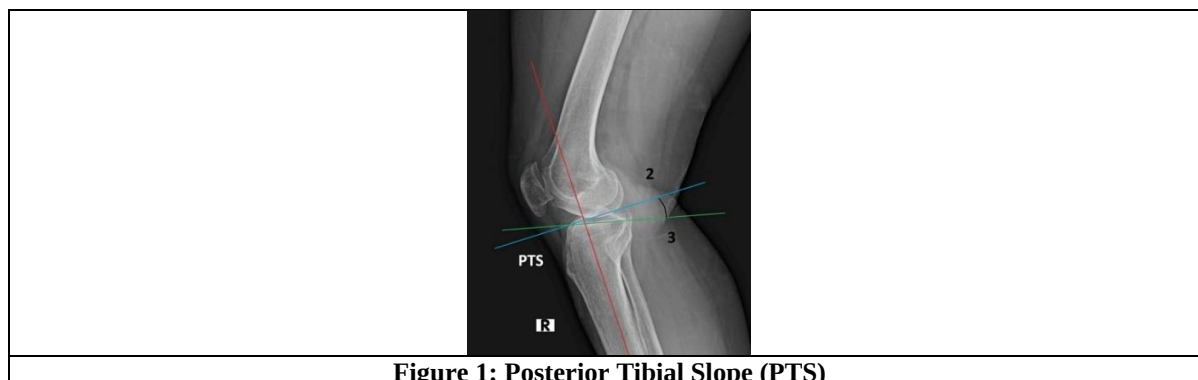


Figure 1: Posterior Tibial Slope (PTS)

Line no. 4- The line was drawn by “defining two points each on anterior and posterior cortices of the tibial metaphysis and joining the midpoints (axis of

metaphysis). The angle formed between Line 1 and line 4 is the MDA.^[2] This is shown in Figure 2.



Figure 2: Metaphysis-Diaphyseal Angle (MDA)

Statistical Analysis

All tools used were free to use. Data was initially entered into a Microsoft Excel spreadsheet, and the final statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). This is a licensed software obtained through the institution. Categorical variables like age were expressed as frequencies and percentages. In contrast, quantitative data like gender, duration of symptoms, VAS, varus deformity, valgus deformity, ROM, PTS and MDA were summarized using means with standard deviations ($\pm$ SD) and medians accompanied by the 25th and 75th percentiles (interquartile range) were used to analyse results of PTS and MDA. Associations between quantitative variables like PTS, MDA and KL grade was evaluated using ANOVA (Analysis of Variance) to obtain the p value. A p-value of less than 0.05 was considered indicative of statistical significance. Since there were multiple variables, ANOVA was used to eliminate the risk of type 1 error (false positive).

RESULTS

The present study was done on 100 patients with OA of knee of age more than 40 years. We could only

get 19 patients of grade 1, this is because most of the patients in early grades do not opt to see a doctor, and instead they prefer home remedies. To achieve an equal number of distributions among all 4 grades, data of 76 patients was randomized so that any selection bias can be omitted. Among 76 cases, 32 (42.11%) were aged 41 to 50 years, 23 (30.26%) were 51 to 60 years, 14 (18.42%) were 61 to 70 years, and 7 (9.21%) were 71 to 80 years. The mean $\pm$ SD age was 54.39 ± 10.4 years. Out of the total study subjects, 55 (72.37%) patients were females and 21 (27.63%) were males. The mean duration of symptoms was 3.69 ± 1.85 years. The mean VAS score of study subjects was 5.34 ± 1.79 . Mean varus and valgus were $2.46 \pm 4.23^\circ$ and $0.2 \pm 1.72^\circ$, respectively. Mean extension and flexion were $0.79 \pm 3.17^\circ$ and $118.68 \pm 16.46^\circ$, respectively. Osteoarthritis (KL Grade) was distributed equally across grades 1, 2, 3, and 4, with 19 cases (25.00%) in each grade. The mean MDA was $22.24 \pm 1.61^\circ$. The mean $\pm$ SD of the MDA was highest in grade 4 ($24.25 \pm 0.91^\circ$), followed by grade 3 ($22.84 \pm 0.64^\circ$), grade 2 ($21.45 \pm 0.57^\circ$), and lowest in grade 1 ($20.41 \pm 0.6^\circ$). As there were multiple groups p value was obtained using ANOVA test which showed significance among grades (p value < 0.0001). This is shown in Table 1.

Metaphysis–Diaphyseal Angle ($^\circ$)	KL & Grade 1 (n=19)	KL Grade 2 (n=19)	KL Grade 3 (n=19)	KL Grade 4 (n=19)	Total	P-Value	Statistical test used
Mean $\pm$ SD	20.41 $\pm$ 0.6	21.45 $\pm$ 0.57	22.84 $\pm$ 0.64	24.25 $\pm$ 0.91	22.24 $\pm$ 1.61	<.0001*	ANOVA [#] F Value= 110.345
Median (25th–75th percentile)	20.5 (20–20.9)	21.5 (21.25–21.8)	22.9 (22.55–23.2)	24 (23.7–24.5)	22 (21.2–23.6)		
Range	19.4–21.3	19.5–22.2	21.4–23.9	22.9–26.5	19.4–26.5		

Table 1: Association of Metaphysis–Diaphyseal Angle with Grade of Osteoarthritis (KL Grade)

Legends used in table 1

$^\circ$ = degree

* p value found out from test used ANOVA

ANOVA = Analysis of Variance

& = Kellgren Lawrence

Mean PTS was $12.43 \pm 1.66^\circ$. The mean $\pm$ SD of the PTS was highest in grade 4 ($14.59 \pm 0.79^\circ$), followed

by grade 3 ($12.83 \pm 0.6^\circ$), grade 2 ($11.83 \pm 0.77^\circ$), and lowest in grade 1 ($10.46 \pm 0.61^\circ$), as there were multiple groups p value was obtained using ANOVA test which showed significance among grades (p value < 0.0001). This is shown in Table 2.

Posterior Tibial Slope ($^\circ$)	KL & Grade 1 (n=19)	KL Grade 2 (n=19)	KL Grade 3 (n=19)	KL Grade 4 (n=19)	Total	P-Value	Statistical test used
Mean $\pm$ SD	10.46 ± 0.61	11.83 ± 0.77	12.83 ± 0.6	14.59 ± 0.79	12.43 ± 1.66	$<.0001^*$	ANOVA F value =116.958
Median (25th-75th percentile)	10.5 (10.05-10.9)	11.5 (11.5-12.35)	12.9 (12.5-13.2)	14.5 (14.1-14.9)	12.5 (11.2-13.625)		
Range	9.2-11.4	10-13.2	11.2-13.7	13-16.5	9.2-16.5		

Table 2: Association of Posterior Tibial Slope with Grade of Osteoarthritis (KL Grade)

$^\circ$ = Degree

* = p value taken from ANOVA

ANOVA = Analysis of variance

& = Kellgren Lawrence

A significant, very strong positive correlation was seen between MDA and PTS ($r=0.862$, $p<0.0001$). This is shown in Figure 3.

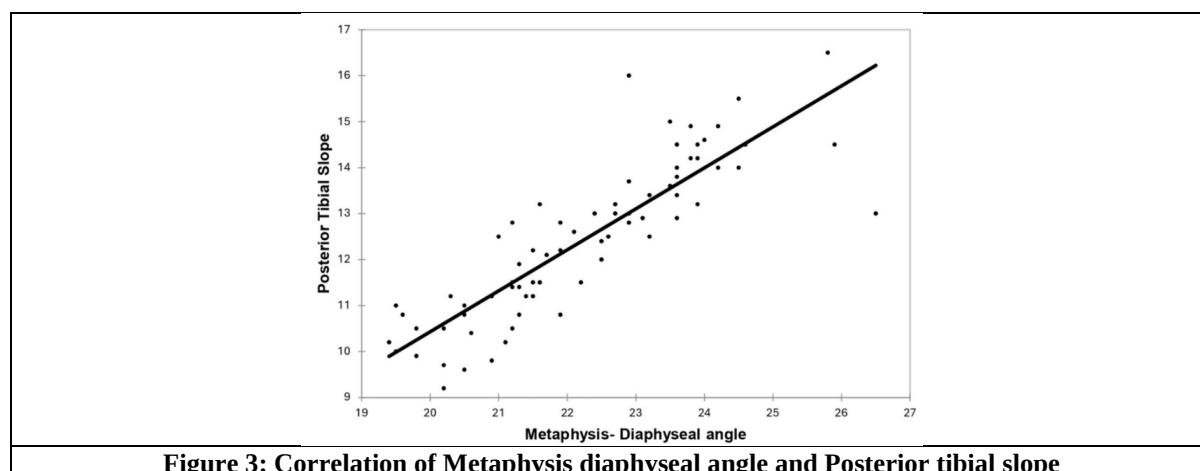


Figure 3: Correlation of Metaphysis diaphyseal angle and Posterior tibial slope

DISCUSSION

In this research, the degree of mean varus and valgus deformities were $2.46 \pm 4.23^\circ$ and $0.2 \pm 1.72^\circ$. In the study by Sharma S et al., varus alignment was defined as $\leq 178^\circ$ and valgus as $\geq 182^\circ$.^[11] Varus alignment was present in 41.4% of patients and valgus alignment in 19.4% of patients. The mean $\pm$ SD extension was $0.79 \pm 3.17^\circ$, and flexion was $118.68 \pm 16.46^\circ$. In the study by Maricar N et al., the mean extension and flexion were 101 and 101 $^\circ$ respectively.^[12] In the study by McCarthy et al., on 23 patients with knee osteoarthritis, the mean flexion in patients was 54.8° .^[13] In a study by Steultjens MP et al., the mean values of knee flexion in the left and right knees were 136.3 ± 11.4 and 136.3 ± 10.6 , respectively and knee extension in the left and right knees was 0.3 ± 5.3 and 0.2 ± 5.2 , respectively.^[14] The mean values of hip flexion in the left and right knees were 115.4 ± 12.3 and 115.3 ± 11.7 , respectively, and hip extension in the left and right knees was 2.3 ± 7.3 and 2.2 ± 7.6 , respectively.

In the present study, KL Grade was distributed equally across grades 1, 2, 3, and 4, with 19 cases (25.00%) in each grade. In the study by Joo SH et al., out of patients, KL grade 0 was present in 4566 (38.34%) patients, grade 1 in 2873 (24.12%), grade 2 in 1792 (15.05%), grade 3 in 1842 (15.47%), and grade 4 in 837 (7.03%) patients.^[15] Törmälehto S et al., reported that out of patients with osteoarthritis, Grade 0 was present in 1,199 (28%) patients, Grade 1 in 661 (15.5%) patients, Grade 2 in 1,288 (30.1%) patients, Grade 3 in 841 (19.7%) patients and Grade 4 in 289 (6.8%) patients.^[16]

The mean metaphysis-diaphyseal angle was $22.24 \pm 1.61^\circ$ in the present study. Among other similar studies, Mohanty SS et al., reported that the mean MDA in Indian patients with OA was $23.76 \pm 5.50^\circ$ and Juneja J et al., found that the mean MDA of 21 patients with OA was 20.13° .^[2,3] Thirunarayanan et al., reported that the mean MDA of 91 osteoarthritic knees was $25.03 \pm 3.05^\circ$.^[10] Bhattacharyya TD et al., reported that the mean MDA in patients with OA was $24.59 \pm 3.95^\circ$.^[4]

Mean PTS was $12.43 \pm 1.66^\circ$. Among other similar studies, Mohanty SS et al., reported that the mean PTS was $11.64 \pm 4.54^\circ$.^[2] In the study by Muthuuri JM, the mean PTS of 152 OA patients was determined as 6.6° .^[8] Juneja J et al., found that the mean PTS of 21 patients with OA was 13.40° .^[3] Thirunarayanan et al., reported that the mean PTS of 91 osteoarthritic knees was $14.05 \pm 2.38^\circ$.^[10] In the study by Saidapur SK et al., the mean PTS of 153 patients with early knee OA (KL Grade 1 and 2) was 11.5° with a standard deviation of 1.34° .^[9] Bhattacharyya TD et al., reported that the mean PTS in patients with OA was $14.00 \pm 2.26^\circ$.^[4]

We found that there was a significant association of PTS with the grade of OA wherein mean PTS increased from 10.46 ± 0.61 in grade 1 to 11.83 ± 0.77 in grade 2 to 12.83 ± 0.6 in grade 3 to 14.59 ± 0.79 in grade 4, with a significant difference of $P < 0.0001$. This shows that increasing the grade of osteoarthritis carries a significant association with an increase in PTS.

This research showed that there was a significant association of MDA with the grade of OA, wherein mean MDA increased from 20.41 ± 0.6 in grade 1 to 21.45 ± 0.57 in grade 2 to 22.84 ± 0.64 in grade 3 to 24.25 ± 0.91 in grade 4, with a significant difference of $P < 0.0001$. This shows that increasing the grade of OA carries a significant association with an increase in MDA.

To the best of our knowledge, no study has assessed the association of MDA and PTS with the grade of OA. However, the studies have compared in a case-control manner the association of PTS with osteoarthritis against healthy controls.

Similar to the study by Thirunarayanan et al., compared to healthy controls, there was a significant association of PTS with OA as well as MDA with OA.^[10] Compared to controls, cases had significantly higher PTS (14.05° vs. 9.69°) and

MDA (25.03° vs. 19.87°) ($P < 0.05$ for both). In the study by Muthuuri JM osteoarthritis showed significant association with PTS.^[8] The value of PTS in patients with osteoarthritis was significantly lower than healthy controls (6.1 vs. 6.8 , $P < 0.05$). However, their study was conducted on moderate to severe grade (Kellgren & Lawrence grade II-IV) osteoarthritis patients.

In the present study, a significant, very strong positive correlation was seen between MDA and PTS ($r = 0.862$, $p < 0.0001$). This was similar to previous studies. Bhattacharyya TD et al., reported that a linear relationship existed between MDA and PTS ($r = 0.620$, $p < 0.05$).^[4] Thirunarayanan et al., reported that there was a moderate positive correlation between PTS and MDA ($r = 0.64$, $p < 0.05$).^[10] In the study by Juneja J et al., there was a strong positive correlation between preoperative PTS and MDA ($r = 0.736$, $p < 0.05$).^[3] Mohanty SS et al., reported a strong correlation between PTS and MDA was observed ($r = 0.72$, $p < 0.05$).^[2]

This shows that PTS and MDA go hand-in-hand in OA. Our study specifically showed that with an increase in KL grades of osteoarthritis, there was an increase in both PTS and MDA, and both showed significant correlation, indicating that either of the markers is good for comparing osteoarthritis against healthy controls or assessing the grades of osteoarthritis.

Table 3 shows a summary of articles reviewed which showed the degrees of PTS, MDA and its association with OA of knee and also the reference grade used. In many studies grades were not specified^[3,8,10] whereas Mohanty et al., used Ahlback grading.^[2] Only Saidapur et al., used and specified KL grades but they only used grades 1 and 2.^[9] There was no study which used KL grade from 1 to 4 as in the present study.

Table 3: Comparison with Other Studies

Study Name	Year	n	PTS	MDA	Association with OA	Reference Grade
Our study	2025	100	$12.43 \pm 1.66^\circ$	$22.24 \pm 1.61^\circ$	PTS Grade 1: 20.41 ± 0.6 Grade 2: 21.45 ± 0.57 Grade 3: 22.84 ± 0.64 Grade 4: 24.25 ± 0.91 MDA Grade 1 10.46 ± 0.61 Grade 2: 11.83 ± 0.77 Grade 3: 12.83 ± 0.6 Grade 4: 14.59 ± 0.79 ($P < 0.0001$ for both)	KL & Grade 1-4
Mohanty SS et al. ^[2]	2013	100	$11.64 \pm 4.54^\circ$	$23.76 \pm 5.50^\circ$	-	Ahlback Grade 4-5
Muthuuri JM ^[8]	2014	152	6.6°	-	PTS: Cases: 6.1 Controls: 6.8 ($P < 0.05$)	Grade not specified

Juneja J et al ^[3]	2017	21	13.40°	20.13°	-	Grade not specified
Thirunarayanan et al ^[10]	2020	121	14.05±2.38°	25.03±3.05°	PTS: Cases: 14.05° Controls: 9.69° MDA Cases: 25.03° Controls: 19.87° (P<0.05 for both)	Grade not specified
Saidapur SK et al ^[9]	2023	153	11.5±1.34°	N/A	-	KL Grade 1-2 only
Bhattacharyya TD et al ^[4]	2024	347	14.00±2.26°	24.59±3.95°	PTS: Cases: 14.00±2.26° Controls: 9.78±2.40° MDA Cases: 24.59±3.95° Controls: 19.58±4.27° (P<0.05 for both)	KL Grade (Not specified)

Legends used in Table 3

°=degrees

&= Kellgren Lawrence

Limitations

This study was not without limitations. Being a single center study, its results cannot be generalized to broader population groups. The study was a cross-sectional observational study. Thus, this investigation provides data at a single point in time. This limits the ability to derive causal relationships between severity of osteoarthritis and changes in PTS or MDA. There is a possibility of inter-observer and intra-observer variability in radiographic measurements of PTS and MDA. The study did not assess functional outcomes, like gait analysis, activity levels, or quality of life. This limits knowledge about the effect of anatomical changes on clinical disability or surgical outcomes. Other anatomical aspects of the knee, such as the coronal plane alignment of tibia and its variations with age, sex, and the onset of osteoarthritis, the medio-lateral and antero-posterior dimensions of the tibia, and the correlation between these variables, were not considered.

CONCLUSION

Both PTS and MDA showed a statistically significant progressive increase with the severity of OA as classified by KL grading. The mean PTS and MDA values were found to increase consistently from KL Grade 1 to Grade 4, indicating a strong association between these anatomical parameters and the progression of degenerative changes in the knee joint. These findings highlight the potential of PTS and MDA as radiological markers in assessing the severity of OA and may provide important information to clinicians in the diagnosis and surgical planning for OA management in the Indian population. Hence, it can be concluded that good old Kellgren Lawrence grade is still a good tool to use

for grading Osteoarthritis of knee for a quick assessment in the out-patient clinic and PTS and MDA can be later used for pre surgery planning.

REFERENCE

1. Kellgren JH, Lawrence JS. Radiological assessment of osteo-arthritis. *Ann Rheum Dis* 1957;16:494-502.
2. Mohanty SS, Rao NN, Dash KK, et al. Correlation of posterior tibial slope with metaphysio-diaphyseal angle in total knee arthroplasty: A radiological study. *Indian J Orthop* 2013;47:67-71.
3. Juneja J, Mustafa S, Gupta R. Correlation of posterior tibial slope with metaphysio-diaphyseal angle in total knee arthroplasty: a radiological study. *Int J Sci Study* 2017;5(8):28-39.
4. Bhattacharyya TD, Das P, Gogoi P, et al. Comparative study of posterior tibial slope & metaphysio-diaphyseal angle in osteoarthritis knee and normal knee attending tertiary care centre in North-east India. *JOEP* 2025;4:1-4.
5. Kayaalp ME, Winkler P, Zsidai B, et al. slope osteotomies in the setting of anterior cruciate ligament deficiency. *J Bone Joint Surg Am* 2024;106:1615-28.
6. Rodriguez-Merchan EC, Encinas-Ullan CA. Knee Osteoarthritis Following Anterior Cruciate Ligament Reconstruction: Frequency, Contributory Elements, and Recent Interventions to Modify the Route of Degeneration. *Arch Bone Jt Surg* 2022;10:951-8.
7. Driban JB, Stout AC, Duryea J, et al. Coronal tibial slope is associated with accelerated knee osteoarthritis: data from the Osteoarthritis Initiative. *BMC Musculoskelet Disord* 2016;17:299.

8. Muthuuri JM. Determination of posterior tibia slope and slope deterioration with osteoarthritis: a radiological study in an African population. *EAJO* 2014;8:16-20.
9. Saidapur SK, Srinivas PS, Shete S, et al. Radiological assessment of the posterior tibial slope as a risk factor for osteoarthritis of the knee in Indian population. *Trends Clin Med Sci* 2023;397-402.
10. Thirunarayanan V, Ramprasath DR, Amarnath R, et al. An observation of posterior tibial slope and metaphysio-diaphyseal angle in Indian population. *J Orth Joint Surg* 2020;2:52-6.
11. Sharma L, Song J, Dunlop D, et al. Varus and valgus alignment and incident and progressive knee osteoarthritis. *Ann Rheum Dis* 2010;69:1940-5.
12. Maricar N, Parkes MJ, Callaghan MJ, et al. Do Clinical correlates of knee osteoarthritis predict outcome of intraarticular steroid injections?. *J Rheumatol* 2020;47(3):431-40.
13. McCarthy I, Hodgins D, Mor A, et al. Analysis of knee flexion characteristics and how they alter with the onset of knee osteoarthritis: a case control study. *BMC Musculoskelet Disord* 2013;14:169.
14. Steultjens MP, Dekker J, van Baar ME, et al. Range of joint motion and disability in patients with osteoarthritis of the knee or hip. *Rheumatology (Oxford)* 2000;39:955.
15. Joo SH, Song JW, Shin K, et al. Knee osteoarthritis with a high grade of Kellgren-Lawrence score is associated with a worse frailty status, KNHANES 2010-2013. *Sci Rep* 2023;13:19714.
16. Törmälehto S, Mononen ME, Aarnio E, et al. Health-related quality of life in relation to symptomatic and radiographic definitions of knee osteoarthritis: data from Osteoarthritis Initiative (OAI) 4-year follow-up study. *Health Qual Life Outcomes* 2018;16:154.

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