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Inter-rater Reliability of Weight Bearing Knee Joint Space Measurements Obtained with Diagnostic Ultrasound

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Background

Historically, joint space has been determined via x-ray; ultrasound has been suggested as a better choice since it involves no radiation. Documenting joint space is clinically important to determine the degree of degenerative progression associated with osteoarthritis and aging. Reliability of the use diagnostic ultrasound to measure weight-bearing knee joint space has not been investigated.

Purpose

The purpose of this study was to examine the inter-rater reliability of medial and lateral knee joint space measurements while weight-bearing, with the knee flexed to 30, 45, and 60 degrees.

Hypothesis

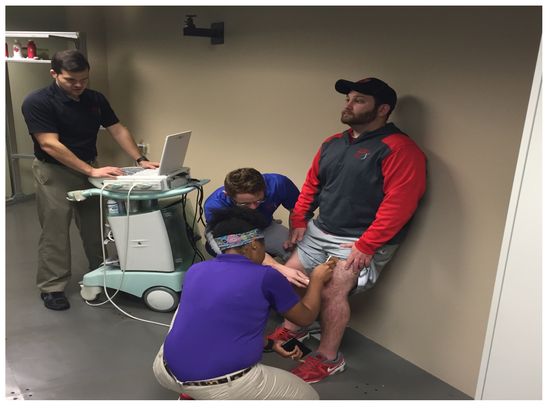
Inter-rater reliability of medial and lateral knee joint space measurements at 30, 45, and 60 degrees of knee flexion will exceed an ICC of 0.75.

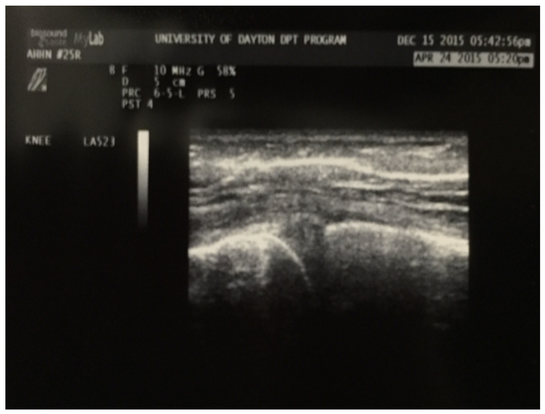
Subjects

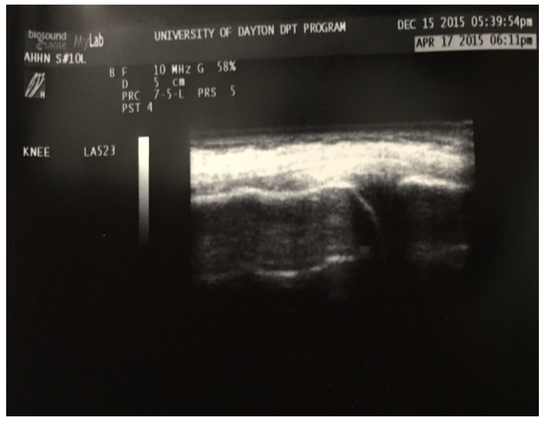
A convenience sample of 30 college students between the ages of 21 and 30 participated in this study.

Methods

The medial and lateral knee joint spaces were visualized using the Biosound Esaote Model 7300 Diagnostic Ultrasound machine (Esaote North America, Inc., Indianapolis, IN). While standing with heels 11 inches from the wall, each subject was asked to lean back onto the wall and sequentially bend both knees to 30, 45 and 60 degrees of flexion. Joint space was measured between the tibial plateau and the femoral condyle. Medial and lateral measurements were obtained by 4 different investigators at different times. Each investigator had been trained and had completed data collection on 5 pilot subjects, prior to the study. The interclass correlation coefficient (2,1) was calculated for each measure.







This project was completed in partial fulfilment of requirements for the Doctor of Physical Therapy degree

Results

Interrater reliability values exceeded 0.75 for all measures except lateral knee joint space at 45° knee flexion, which ranged from poor to good (ICC=.0.46-0.89).

Table: Inter-rater Reliability (ICC)

	30 Degrees	45 Degrees	60 Degrees
Lateral Measures	.78-.91	.46-.89	.67-.82
Medial Measures	.79-.95	.87-.94	.76-.85

Discussion

These results suggest that physical therapists are able to accurately measure knee joint space with diagnostic ultrasound. However, inter-rater reliability for the lateral view at 45° of knee flexion was variable. This could be due to subjective differences when determining marker placement for the measurement of lateral knee joint space on freeze-framed joint images on the diagnostic ultrasound machine. It is also possible that soft tissue interfered at 45° of knee flexion, making the measurement more difficult to determine.

Conclusion

Diagnostic ultrasound of knee joint spaces in weight-bearing performed by physical therapists is reliable.

Clinical Relevance

This tool may be clinically useful in determining the extent of osteoarthritic degeneration of the knee by documenting changes in joint space.

References

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