

The Effect of Decreased Hip Range of Motion on Seated Posture

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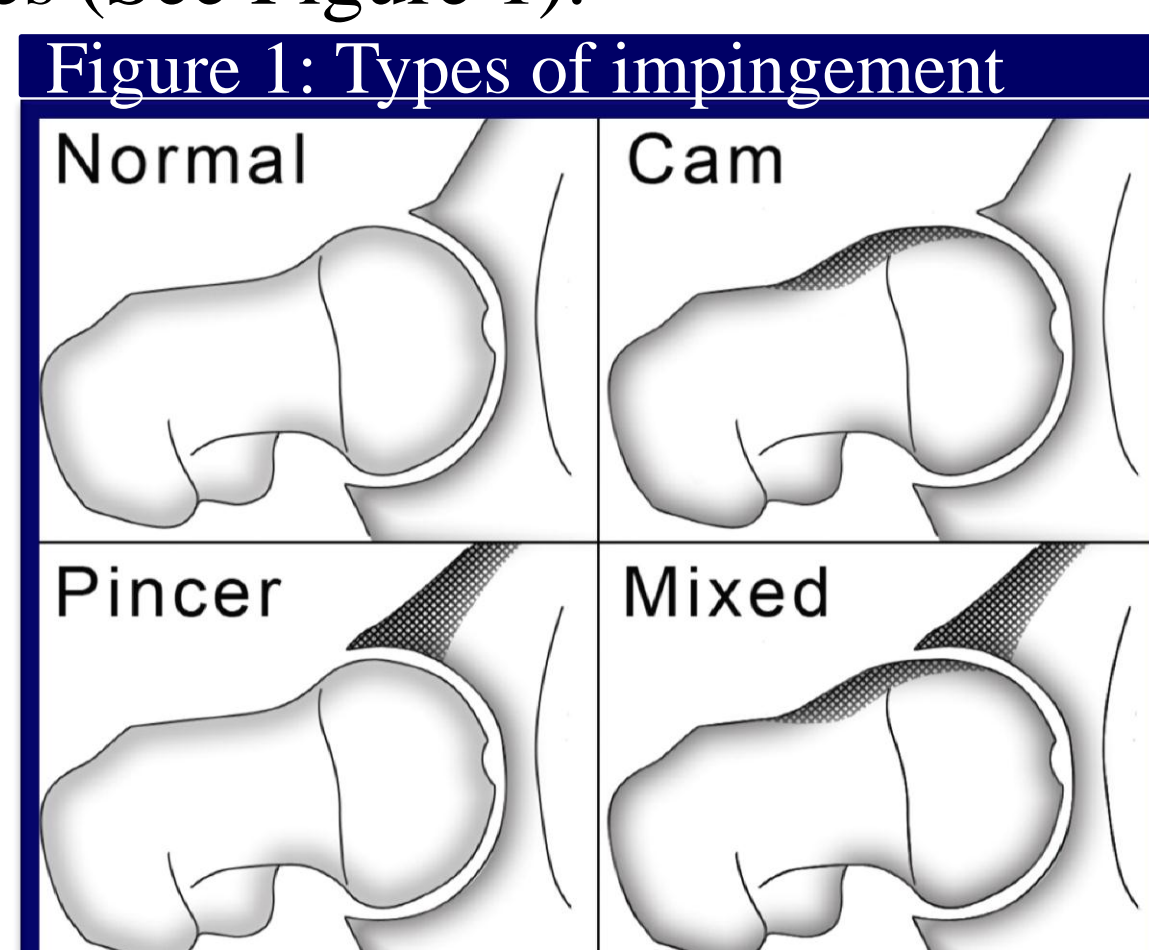


ABSTRACT

Femoroacetabular impingement (FAI) results from an abnormal contact between the femur and the pelvis. Due to this impingement, the individual experiences pathological changes or conditions in the femoral neck, labrum, and/or acetabulum. It was our intent to investigate whether college age individuals experiencing hip impingement or discomfort, due to clinical signs associated with FAI, were more likely to adopt a reclined (slouched) position while sitting in class. Video recordings were taken of each participant's seated posture during a class period and were reviewed to determine how much time each student spent in each seated position (i.e., flexed, upright, reclined). We followed the recordings with a clinical evaluation of their hip range of motion (flexion and internal rotation), completion of the hip impingement test, and a short demographic survey. Results showed that 25.7% of the participants (N=144) exhibited a clinical positive for decreased hip internal rotation, thus warranting further radiographic examination for FAI. A prior history of hip/groin pain was reported in 14% of the total population. A marginal significance ($p < .058$) was seen correlating patients with decreased hip flexion (HF) (<115 degrees) or hip internal rotation (IR) (<30 degrees) in the left hip adopted and sitting in an upright or slouched position; while a significant correlation ($p < .001$) was found for individuals with decreased internal rotation in the right hip and sitting in a reclined position. In conclusion, we found that students who sat in a slouched position during class were likely to have a decrease in hip function. From a clinical viewpoint, the decreased hip functioning could effect physical activity, biomechanical movement and thus possibly lead to an increase risk of injury. We hypothesize that this decrease in hip function may be due to the pathological effects of femoroacetabular impingement, thus requiring further investigation.

Background

- Femoroacetabular impingement (FAI) occurs when there is an abnormal contact between the femoral neck and acetabulum.
- Friction that occurs due to this abnormal pathological disfiguration of the bony structures often results in hip or groin pain and discomfort and hindrance in hip range of motions.
- There are two types of FAI, a Cam and Pincer deformity. Cam impingement involves an abnormally shaped or enlarged femoral head and neck that sits within the hip joint. Pincer impingement involves the deformation of the acetabulum, causing it to hang too far out over the femur. Both result in the acetabulum rubbing on the femoral neck as the hip moves (See Figure 1).
- Both types of FAI deformities involve application of shear forces to the involved structures, causing damage to the acetabular cartilage and labrum.
- Symptoms and discomfort are most often noted in people who participate in activities involving an increased amount of hip flexion and/or internal rotation (e.g., yoga, gymnastics, hockey, and martial arts).
- Sitting in an upright or forward flexed position may cause further stress to the structures at the hip in individuals experiencing impingement.
- FAI is clinically diagnosed through physical assessment and radiographic imaging (MRI and 3D CT scan).



EXPERIMENTAL AIM

To investigate whether college age individuals experiencing hip impingement or discomfort, due to clinical signs associated with FAI, were more likely to adopt a reclined (slouched) position while seated in class.

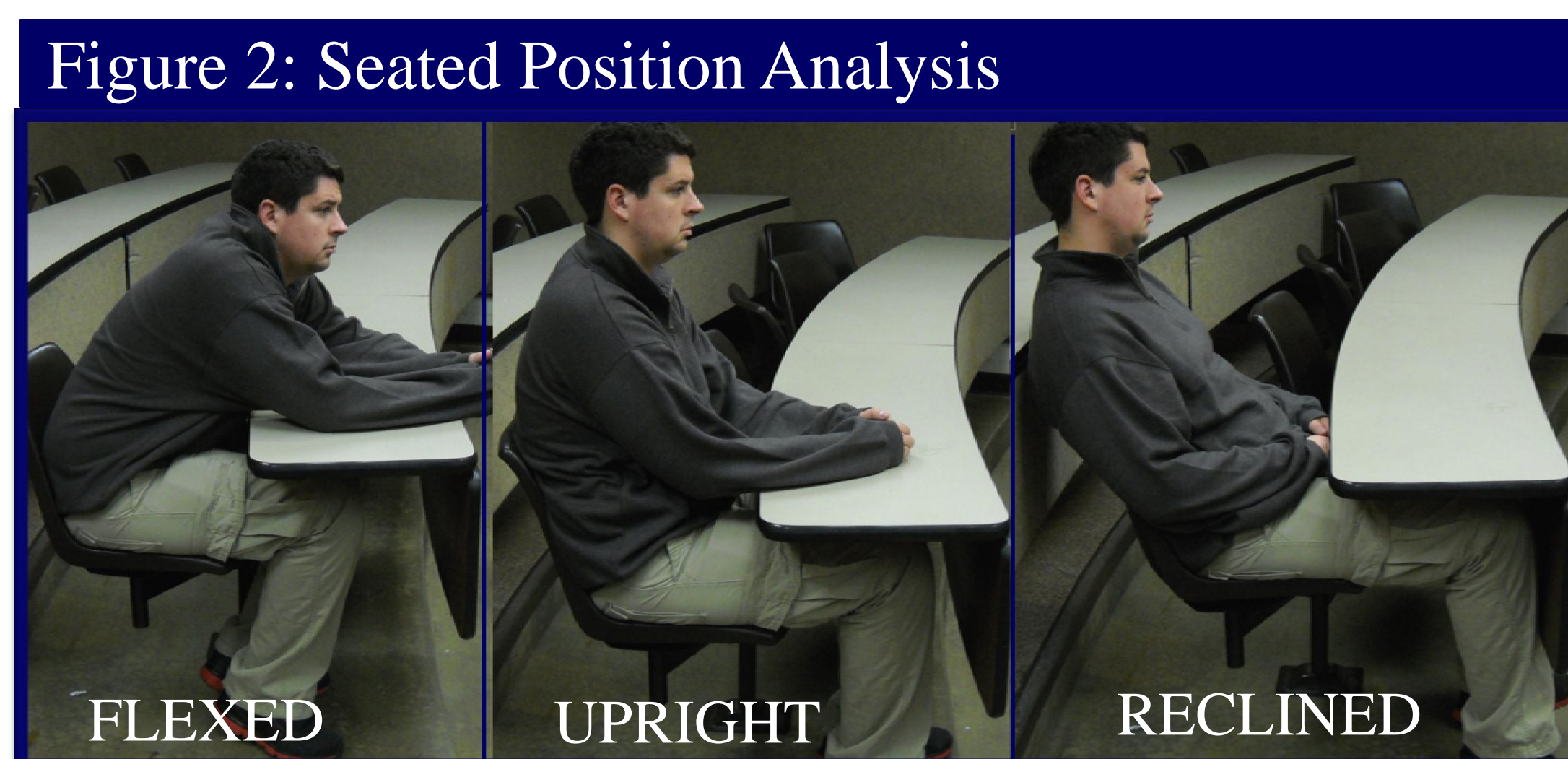
METHODS

Subjects

- Total number of subjects = 144; total number of hips = 288
- College students aged 19-36 participated in this study. (M = 20.47; SD = 2.309)
- All subjects provided written informed consent according to the guidelines of the University of Wisconsin – Eau Claire.

Screening and Testing Procedures

- Video taped students sitting during a full class period (20-60 minutes). A total of six classes were recorded. Video recordings were taken from a concealed room in the back of the classroom. The subjects were unable to see the video cameras.
- We noted each individual's time spent in a flexed, upright, or reclined seated position (See Figure 2).



- At the conclusion of the class, we provided each student with a short demographic survey to obtain demographic information and a past medical history of hip pain, discomfort, and/or pathology.
- Evaluated hip range of motion, including flexion and internal rotation, and performed the hip impingement (noting pain in the anterior hip with internal rotation; see Figure 3) and Trendelenberg tests on each participants hip.

Criteria

- Hip Flexion (HF) < 115°
- Internal Rotation (IR): < 30° (moderate); < 20° (severe)
- Pain with Internal Rotation (positive hip impingement test)



STATISTICAL ANALYSIS

Descriptive statistics was used to report the characteristics of the population as well as chi-square analysis to test the proportionality of pathological symptoms and functioning. Statistical significance was set at $p < .05$. Statistical analyses were performed using SPSS version 18.0 (SPSS Inc).

RESULTS

Table 1: History and Evaluation Data

	Cohort (N=144)	Females (n=71)	Males (n=73)
HF Deficit - R	63 (43.75%)	28 (39.44%)	35 (47.95%)
HF Deficit - L	64 (44.43%)	28 (39.44%)	36 (49.32%)
Moderate IR Deficit - R	39 (27.08%)	13 (18.31%)	26 (35.62)
Moderate IR Deficit - L	35 (24.31%)	14 (19.72%)	20 (27.4%)
Extreme IR Deficit - R	13 (9.03%)	4 (5.63%)	9 (12.33%)
Extreme IR Deficit - L	13 (9.03%)	5 (7.04%)	8 (10.96%)
Impingement - R	4 (2.78%)	2 (2.82%)	2 (2.74%)
Impingement - L	1 (0.69%)	0 (0.00%)	1 (1.37%)
History of Groin Pain	19 (13.19%)	11 (15.49%)	8 (10.96%)

Note. HF = Hip Flexion; IR = Internal Rotation; R = Right; L = Left

- Results showed that 25.7% of the participants (N=144) exhibited a clinical positive for decreased hip internal rotation.
- According to the survey, prior history of hip/groin pain was reported in 14% of the total population.
- A significant correlation ($p < .001$) was found for individuals with decreased internal rotation in the right hip and sitting in a slouched seated position.
- A marginal significance ($p < .058$) was seen correlating patients with decreased hip flexion (HF) (<115 degrees) or hip internal rotation (IR) (<30 degrees) in the left hip and the adoption of an upright or slouched seated position.

SUMMARY AND CONCLUSIONS

- We found that students who sat in a slouched position during class were likely to have a decrease in hip function.
- A decrease in hip function could affect physical activity, biomechanical movement, and could possibly lead to an increase risk of injury.
- We hypothesize that this decrease in hip function and mobility may be due to the pathological effects of femoroacetabular impingement.

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