

CAHE *Allied Health News in Review*

Are women more likely to hurt their knees at different times in their menstrual cycle?

Plain English Findings

The relationship between the female reproductive cycle, knee joint laxity and the mechanics of the knee joint was investigated in a series of studies. Different levels of laxity were shown at different stages of the reproductive cycle, although the stage of the reproductive cycle in which the knee ligaments were at their most lax differed between women. Most commonly, maximum knee joint laxity was found during ovulation. Knee joint laxity (when present) was shown to correspond to changes in knee mechanics during an athletic activity. These changes could potentially be a risk factor for knee injuries. The findings of these studies will be of interest to athletes, coaches, sporting organisations and to those involved in designing injury prevention programs.

Article titles

- 1) Changing hormone levels during the menstrual cycle affect knee laxity and stiffness in healthy female subjects. Available at: <http://ajs.sagepub.com/content/37/3/588>
- 2) Alterations in knee joint laxity during the menstrual cycle in healthy women leads to increases in joint loads during selected athletic movements. Available at: <http://ajs.sagepub.com/content/early/2009/03/13/0363546508330146.long>
- 3) Relationship between knee joint laxity and knee joint mechanics during the menstrual cycle. Available at: <http://bjsm.bmj.com/cgi/reprint/43/3/174>

Reported online at *Medical News Today* on 20th April 2009

<http://www.medicalnewstoday.com/articles/146630.php>

The origin of evidence:

This health news article from Medical News Today reports on a series of studies published in the American Journal of Sports Medicine and the British Journal of Sports Medicine. The authors of these studies are based at the faculty of kinesiology at the University of Calgary in Canada.

The objectives of research:

- 1) To investigate the relative stiffness and laxity of knee ligaments during three phases of the menstrual cycle (follicular, ovulation and luteal phases) during jumping, cutting and stopping.
- 2) To investigate differences in forces through the knee joint between these stages of the menstrual cycle (which is potentially a risk factor for knee ligament injury).

The nature of evidence:

- Article 1: Case control study
- Article 2: Cross sectional study
- Article 3: Cross sectional study

Participants involved in the research

The three studies were conducted with 2 different groups of participants. Studies 1 and 2 both looked at the same group of 26 healthy females with a mean age of 22 years who had not had a previous knee injury and had not used the oral contraceptive pill in the last 6 months. The third study recruited a very similar group of females (25 in total) with the same inclusion criteria as studies 1 and 2. Most were recreational athletes.

Key findings from the three studies:

- 1) Changes in knee joint stiffness and laxity were noted during different phases of the reproductive cycle for all women, most commonly in the ovulation phase, however this differed between women.
- 2) When knee joint laxity was present, it was associated with increased forces through the knee joint. These forces could potentially be associated with knee injury, in particular anterior cruciate ligament injury.

Recommendations made by the authors:

It was proposed that these findings may be beneficial to researchers who are developing ACL injury prevention programs.

Methodological considerations:

The purpose of these studies was to investigate the relationship between phases of the menstrual cycle, laxity of knee ligaments and the resulting forces in the knee. A randomised controlled trial was not the most appropriate study design to investigate this relationship. The most appropriate study design to investigate this relationship was a case control and cross sectional design, which was chosen by the researchers. Now that a relationship between knee joint laxity and increased joint forces has been established, future studies of a more rigorous design such as randomised controlled trials can be conducted.

The method of recruiting participants for these studies was not reported, however this information is more relevant for trials which are testing an intervention, rather than investigating a relationship.

Validity and reliability of the conclusions:

Internal validity and reliability:

The participants in these studies were of a similar height, weight, age and activity level. Variations in hormone levels between subjects were controlled by excluding those who were pregnant, had irregular menstruation or had been taking the oral contraceptive pill over the last 2 years. Despite this, the authors acknowledge some limitations in their study. The measurement of joint laxity and mechanics do not take into account the skill, strength or control of an athlete, or their movement patterns. In addition, muscular fatigue or an athlete's current level of training may also influence knee joint mechanics and resulting forces in the knee.

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External validity:

These study findings may be of most relevance to the recreational athlete, or a coach or health professional working with a recreational athlete.

Clinical implications:

Hormonal changes during the menstrual cycle appear to be related to increased laxity of the knee joint and this laxity appears to be related to increased forces through the knee joint when jumping, cutting and landing. These changes could contribute to the higher rate of anterior cruciate ligament injury that is seen in female athletes. Individual assessment of an athlete's knee laxity, forces through their knee and their skill level, will help determine the relevance of this research to an individual athlete.

Reference:

Reports published by Medical News Today can be accessed at: <http://www.medicalnewstoday.com/>

Article References:

1) Park, S, Stefanyshyn, D, J, Loitz-Ramage, B, Hart, D, A & Ronsky, J, L 2009, 'Changing hormone levels during the menstrual cycle affect knee laxity and stiffness in healthy female subjects', *The American Journal of Sports Medicine*, vol. 37, no. 3, pp. 588-598.

2) Park, S, Stefanyshyn, D, J, Loitz-Ramage, B, Hart, D, A & Ronsky, J, L 2009, 'Alterations in knee joint laxity during the menstrual cycle in healthy women leads to increases in joint loads during selected athletic movements', *The American Journal of Sports Medicine*, viewed online 22nd May 2009
<http://ajs.sagepub.com/content/early/2009/03/13/0363546508330146.long>
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3) Park, S, Stefanyshyn, D, J, Loitz-Ramage, B, Hart, D, A & Ronsky, J, L 2009, 'Relationship between knee joint laxity and knee joint mechanics during the menstrual cycle', *British Journal of Sports Medicine*, vol. 43, pp. 174-179.

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