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Is the Use of Oral Contraceptive Beneficial to Female Athletes in the Prevention of Anterior Cruciat Ligament Injury?

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IS THE USE OF ORAL CONTRACEPTIVE BENEFICIAL TO FEMALE ATHLETES IN THE PREVENTION OF ANTERIOR CRUCIAT LIGAMENT INJURY?

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Introduction

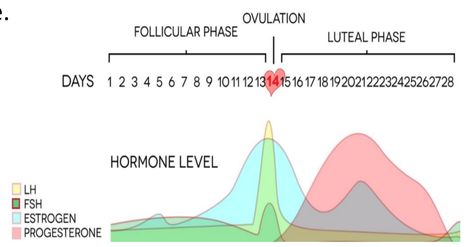
Research has shown that women are 2 to 9 times more likely to sustain an anterior cruciate ligament (ACL) injury than men. The increased risk of ACL injuries in females can be attributed to several factors including anatomical, hormonal, biomechanical, and neuromuscular variations. Previous literature found that female hormones such as relaxin, progestin, and estrogen play a role in ligamentous laxity within the female ACL. Oral contraceptives (OC) regulate these hormones by inhibiting the spike of estrogen and progestin during the menstrual cycle.

Objectives

To investigate the influence of female hormone concentrations on the ACL.
To determine if oral contraceptive supplementation can reduce the risk of ACL injuries in female athletes.

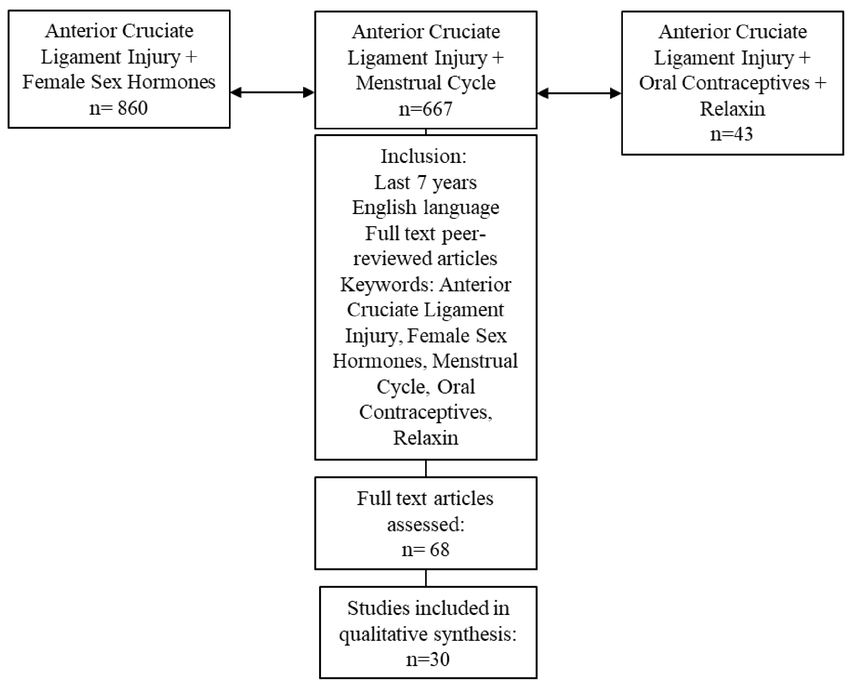
Theoretical Foundation

- Hormone fluctuations during the menstrual cycle put the ACL at risk for injury in female athletes.
- The female ACL has receptors for estrogen, progesterone, and relaxin. This is unique to females because males do not have relaxin receptors located on the ACL (Dragoo et al., 2003).
- When estrogen spikes during the menstrual cycle, it increases the amount of relaxin that can bind to the relaxin receptors. Relaxin is responsible for increasing the laxity of ligaments (Dragoo et al., 2003).
- In theory, if oral contraceptives can regulate the fluctuations of these hormones during the menstrual cycle, the risk of ACL injury will decrease.



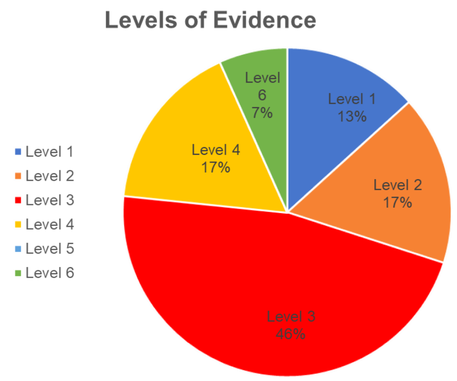
Methods

Using PUBMed, Google Scholar, and other databases, a systematic review was conducted and ranked using the Oxford Levels of Evidence.



Results

Preliminary results revealed a total of 30 articles that were reviewed and ranked according to Oxford Levels of Evidence.



Level	Type of Evidence
I	Systematic review, randomized control trials
II	Cohort studies, "outcomes" research, ecological studies
III	Case control studies
IV	Case series
V	Expert opinion
VI	Animal or lab studies (not involving humans)

Evidence-based medicine: Levels of evidence. Research & Subject Guides. (n.d.). Retrieved March 14, 2022, from https://guides.library.stonybrook.edu/evidence-based-medicine/levels_of_evidence

Discussion

- Approximately 35% of American woman of reproductive age already use some form of hormonal contraceptive (Konopka et al., 2019). 12 million women in the United States under the age of 30 report current use of OC (Scholes et al., 2010).
- Women ages 15-19 who use OC have 18% fewer ACL reconstructions than their age-matched non-users (Gray et al. 2016).
- Studies have suggested that OC may offer up to a 20% reduction in risk of injury by suppressing follicular development by reducing hormonal fluctuations that cause ACL injury (Herzberg et al. 2017).
- There are relaxin receptors on the female ACL that respond to elevated levels of estrogen. Taking oral contraceptives with a higher progestin level decreases the circulating levels of estrogen, therefore, limiting the amount of relaxin that can bind to relaxin receptors (Dragoo et al., 2011; Konopka et al. 2019). The use of OC to modulate these hormonal fluctuations may be beneficial in preventing ACL injuries in female athletes.

Conclusions

- Preliminary results revealed that OC may have an inhibitory effect on relaxin receptors within the female ACL and could be recommended as an option to prevent ligamentous injury.
- Several studies have shown that individuals with elevated serum relaxin levels are at a greater risk of ACL injury. OC are believed to stabilize the levels of estrogen and progestin from peaking during the menstrual cycle. This will prohibit the formation of the corpus luteum-the body's main source of relaxin. According to Konopka et al. (2019) OC with a higher progestin to estrogen ratio have a higher likelihood of increased ACL strength.
- Future studies should investigate the role that OC have on estrogen, progestin and relaxin receptors on the female ACL.

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References available upon request