

Incidence of ACL Injuries in Females by Selective Use of Oral Contraceptive Pills

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OBJECTIVES: Females are more likely to experience anterior cruciate ligament (ACL) injuries compared to males¹. Relaxin, a collagenolytic hormone, among other biomechanical factors play a role in weakening the ACL, consequently increasing the risk of ACL tears in females. Oral contraceptive pills (OCPs) have been found to significantly decrease relaxin in serum and increase ACL strength². The purpose of this study is to investigate the incidence of ACL injuries among females in Colorado that use four different formulations of OCPs.

METHODS: In this retrospective cohort study, de-identified data were obtained from 14,664,162 female patients from 15 to 34 years of age between 2011-2023 from the Colorado Health Data Compass database. A total of 15,570 females who sustained an ACL injury, treated by arthroscopic ACL reconstruction, and 12,878,504 females without a history of ACL injury were included. Among these groups, non-OCP users and OCP users, including formulations norethindrone (NE) only, drospirenone (DS) + ethinyl estradiol (EE), NE + EE, norgestimate (NG) + EE, were included in the analysis. Statistical analysis was completed using RStudio.

RESULTS: Comparing ACL injury incidence with and without OCP use, the proportion of ACL injury incidence with OCP use (0.086%; CI: [0.08, 0.093]) was less than the proportion of ACL injury incidence with no OCP use (0.123%; CI: [0.121, 0.125]). When broken up by five-year intervals, females aged 15 to 19 had no difference in the proportion of ACL injury incidence with OCP use (0.117%; CI: [0.095, 0.143]) compared to ACL injury incidence with no OCP use (0.125%; CI: [0.121, 0.129]), where the other age groups had a decreased incidence of ACL injury with OCP use. This suggests age may be a factor in the effects of OCP use on ACL injury incidence. Additionally, different OCP formulations showed similar ACL injury incidence, with a lower proportion of ACL injuries in the NE only user group (0.029%; CI: [0.019, 0.043]) compared to NE+EE (0.093%; CI: [0.082, 0.104]) and NG+EE (0.094%; CI: [0.083, 0.106]) users. ACL injury incidence in DS+EE (0.104%; CI: [0.083, 0.13]) users had no difference compared to non-contraceptive users (0.123%; CI: [0.121, 0.125]). The progestin only formulation (NE only) showed a lower incidence of ACL injury compared to the estrogen/progestin combination formulations, suggesting a role of progesterone in ACL injury prevention. The average age was similar across groups of OCP formulations.

CONCLUSION: OCP use may be associated with a lower incidence of ACL injury compared to no OCP use in females. Further research is warranted to explore additional variables impacting the association between OCP use and ACL injury, such as birth control formulation and method, mechanism of injury, and subject specific demographics. This study is an initial evaluation of associations between OCP use and ACL injury incidence and whether certain formulations of OCPs could serve protective effects against ACL injuries in females.

REFERENCES:

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