Women on Oral Contraceptives Have Decreased Odds of Lumbar Disc Displacement

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INTRODUCTION:

Lumbar disc displacement (LDD) is a condition that can lead to lumbar / radicular symptoms and related disability. The correlation of patient sex on risk of LDD is not well established. However, some studies have suggested that women have a higher incidence of lumbar intervertebral disc degeneration, and it has been proposed that hormonal fluctuations could influence the risk of LDD.

Oral contraceptives (OCPs) have been hypothesized to corelate with low back pain due to their modulation of sex hormone fluctuations. However, studies on these sex hormones have produced differing results; estrogen deficiency has been found to diminish the integrity of intervertebral discs, but other studies have linked estrogen replacement therapy to worsening low back pain. The potential correlation of OCPs on LDD specifically has been poorly characterized. The current study aimed to investigate the relationship between LDD with sex and OCP use using a large, national database.

METHODS:

The M170Ortho PearlDiver Mariner Patient Claims Database was utilized. The database contains information on demographics, drug prescription records, medical diagnoses, and procedures. The data are de-identified and aggregated, so our Institutional Review Board determined studies utilizing this database as exempt from review.

The database was queried for patients aged 15 to 50 years old with no history of amenorrhea, oligomenorrhea, polycystic ovary syndrome, or using non-OCP sex hormone medications were excluded. The population was filtered for records active between 2017 and 2022 to ensure equivalent patient time coverage for all between-group comparisons during statistical analysis. The population was then stratified by sex, with a total of 52,193 male patients and 60,315 female patients.

To assess the correlation of LDD with patient sex, the male and female cohorts were matched 1:1 by age, Elixhauser Comorbidity Index (ECI), and body mass index (BMI) greater than 40 kg/m^2 or 95th percentile for pediatric patients (severe obesity). The two cohorts were filtered for patients with and without LDD using International Classification of Diseases (ICD) codes.

To assess the correlation of LDD with OCP use in women for secondary analysis, the matched female cohort was stratified by OCP use using prescription drug codes. The OCP cohort and non-OCP cohort were filtered based on LDD, in which being "on OCPs" was defined as having an OCP prescription code within the year prior to LDD.

Demographic characteristics, including age, ECI, and severe obesity, were compared between the matched and unmatched cohorts. Continuous variables were compared using Student's t-tests and categorical variables were compared using Pearson chi-squared tests. Independent predictors of LDD were assessed using multivariable logistic regression.

RESULTS SECTION:

A total of 52,193 male patients and 60,315 female patients were identified that met the inclusion and exclusion criteria. In comparison with the female cohort, the male cohort was found to be older (37.0 vs. 35.1, p<0.001), had a higher ECI (0.2 vs. 0.1, p<0.001), and a lower proportion of patients with severe obesity (9.3% vs. 12.6%, p<0.001). These differences were eliminated after matching. The matched cohorts each consisted of 49,846 patients.

In assessing the correlation of LDD with patient factors by univariate analysis of the matched cohorts, patients with LDD were more likely to be male (55.2% vs. 44.8%, p<0.001). The univariate odds ratio (OR) of LDD between male (reference) and female patients was 0.79 (p<0.001). Upon multivariate analysis, male sex was associated with LDD (OR 1.27, confidence interval [CI] 1.22-1.32, p<0.001).

In assessing the correlation of LDD with OCP use in women by univariate analysis, OCP users were less likely to experience LDD compared to non-OCP users (OR 0.23, p<0.001). In comparison with the male cohort, the OCP cohort had a univariate OR of 0.21 (p<0.001) and the non-OCP cohort had a univariate OR of 0.92 (p<0.001). On multivariate analysis, OCP use was significantly associated with decreased odds of LDD (OR 0.34, CI 0.31-0.38, p<0.001).

DISCUSSION:

Prior literature shows conflicting results on the sex difference of LDD incidence, and there are few studies assessing the potential correlation of OCP use on LDDs.

The current study found that male sex is associated with higher odds of lumbar disc displacement. This may be due to increased mechanical stress and occupational exposures that cause injury to the back. Upon further analysis, female patients on OCPs had lower odds of LDD than those not on OCPs.

As a retrospective administrative database study, this study has several limitations. The data is subject to the accuracy of the administrative codes, causality cannot be established, and other variables that may influence the development of LDD such as occupation cannot be extracted due to the lack of an associated code.

SIGNIFICANCE/CLINICAL RELEVANCE:

This study establishes the sex difference associated with LDD and is the first in the literature to examine the relationship of OCPs and LDD in women. These results may be useful in counseling patients who are at risk of developing LDD and evolving guidelines on injury prevention.