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Quantification of risk factors for cervical OPLL in Korean populations: A nationwide cohort study

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Objective

Ossification of the posterior longitudinal ligament (OPLL) is a pathological calcification of the posterior longitudinal ligament of the spine. The prevalence of cervical OPLL has been shown to differ between ethnic groups and is known to be higher in Asians than in other ethnic groups. Because of the ethnic differences in prevalence, risk factor studies including genetic factors and habitual status have been performed. OPLL progression can cause spinal cord injury that Result in disability. Considering neurologic deficits and disability caused by OPLL, identifying OPLL risk factors for early prediction have important health benefits. The Objective of this study was to quantify risk factors for cervical OPLL using a large nationwide cohort in Korea, a country with a high prevalence of OPLL.

Materials & Methods

The nationwide population-based matched cohort study was conducted using the Korean National Health Insurance Service cohort data. We selected patients with a primary diagnosis of OPLL involving cervical lesion (ICD-10 code: M48.82, M48.83) between 2002 and 2015. To ensure diagnostic validity, we only included individuals who had visited clinics with a diagnosis of OPLL more than three times. A matched cohort without cervical OPLL was enrolled by randomly matching patients by sex, age, year of diagnosis, and residential area to the OPLL group with a ratio of 1:9. Logistic regression analyses were performed to identify risk associated with OPLL development using Odds Ratios and 95% confidence intervals. $P < 0.05$ was considered statistically significant. The statistical software SAS System for Windows, version 9.4 (SAS Institute Inc, Cary, NC) was used to perform the statistical analyses.

Results

In total, 7,450 patients were enrolled in the study: 745 in the OPLL cohort and 6,705 in the matched control cohort. No significant differences in age, sex, year of diagnosis, or residential area were noted between the two groups; as these variables were used for sample matching, this finding indicates that the matching was performed appropriately. After adjusting for age, sex, residential area, and household income, co-morbidities, such as hypertension (OR = 1.283, 95% CI 1.071-1.538), ischemic stroke (OR = 1.386, 95% CI 1.017-1.889), diabetes mellitus (OR = 1.331, 95% CI 1.098-1.615), hypothyroidism (OR = 1.562, 95% CI 1.165-2.094), and osteoporosis (OR = 1.456, 95% CI 1.151-1.842) were significantly associated with the prospective development of OPLL.

Conclusions

After adjustment for age, sex, residential area, and household income, co-morbidities such as hypertension, ischemic stroke, diabetes mellitus, hypothyroidism, and osteoporosis were found to be significantly associated with OPLL occurrence. Our findings can provide useful information for OPLL prediction and offer important health benefits. Additional risk factor studies to elucidate the pathophysiological mechanism of OPLL are recommended.

Table 1. Unadjusted and Adjusted association between Ossification of the Posterior Longitudinal Ligament and Co-morbidities and Demographics

| Variable | Unadjusted OR | | | Adjusted OR | | |
|---------------------------------|---------------|--------------|----------------|-------------|-------------|----------------|
| | OR | 95% CI | <i>p</i> value | OR | 95% CI | <i>p</i> value |
| Co-morbidities | | | | | | |
| Hypertension | 1.405 | 1.182-1.670 | 0.0001 | 1.283 | 1.071-1.538 | 0.0070 |
| Ischemic stroke | 1.482 | 1.097-2.002 | 0.0104 | 1.386 | 1.017-1.889 | 0.0387 |
| Hemorrhagic stroke | 0.716 | 0.346-1.479 | 0.3664 | 0.562 | 0.268-1.179 | 0.1272 |
| Ischemic heart disease | 1.130 | 0.665-1.918 | 0.6516 | 0.897 | 0.524-1.537 | 0.6923 |
| Diabetes mellitus | 1.464 | 1.215-1.765 | <0.0001 | 1.331 | 1.098-1.615 | 0.0036 |
| Hyperthyroidism | 1.381 | 0.996-1.913 | 0.0526 | 1.117 | 0.796-1.567 | 0.5212 |
| Hypothyroidism | 1.748 | 1.316-2.321 | 0.0001 | 1.562 | 1.165-2.094 | 0.0029 |
| Hyperparathyroidism | 1.000 | 0.127-7.893 | 1.000 | 0.738 | 0.091-5.994 | 0.7766 |
| Hypoparathyroidism | 1.500 | 0.181-12.459 | 0.7074 | 1.142 | 0.135-9.654 | 0.9029 |
| Osteoporosis | | | | 1.456 | 1.151-1.842 | 0.0017 |
| Breast cancer | - | | | - | | |
| Endometrial cancer | - | | | - | | |
| Ovarian cancer | - | | | - | | |
| Colorectal cancer | 1.452 | 0.564-3.733 | 0.4393 | 1.651 | 0.637-4.276 | 0.3018 |
| Gastric cancer | 0.420 | 0.154-1.149 | 0.0912 | 0.407 | 0.148-1.118 | 0.0811 |
| Income Level (Quartiles) | | | | | | |
| Q1 (lowest) | 1.000 | | | 1.000 | | |
| Q2 | 1.006 | 0.789-1.283 | 0.9615 | 1.008 | 0.790-1.287 | 0.9466 |
| Q3 | 1.039 | 0.827-1.304 | 0.7443 | 1.023 | 0.814-1.286 | 0.8449 |
| Q4 (highest) | 1.122 | 0.895-1.406 | 0.3192 | 1.087 | 0.866-1.365 | 0.4702 |