Prevalence of temporomandibular disorder in Korea: a nationwide population-based study
A retrospective cohort study

Shin Yi Jang¹, Su Ra Seo², Seong Kyong Kim³, Kyeongsug Kim⁴

¹Imaging Center, Heart Vascular Stroke Institute, Samsung Medical Center, Seoul, Korea
²National Health Insurance Service, Wonju, Korea
³Department of Nursing, Hanseo University, Seosan, Korea
⁴Graduate School of Clinical Nursing Science, Sungkyunkwan University, Seoul, Korea

ABSTRACT

Purpose: Few studies have assessed the prevalence of temporomandibular disorders (TMD) in the Korean population.

Methods: We used cohort data from the Korean National Health Insurance Service between 2012 and 2020. The data consisted of main diagnoses related to TMD (International Classification of Diseases 10th Revision [ICD-10] code: K07.6 and K07.6x). The age-standardized prevalence of TMD was calculated using the estimated Korean population in 2020 as a reference.

Results: The age-standardized prevalence of TMD increased from 604 persons per 100,000 persons in 2012 to 869 persons in 2020. In 2020, the overall age-standardized prevalence was 1,355 persons in the 10 to 19 years age group, 1,809 persons in the 20 to 29 years age group, and 979 persons in the 30 to 39 years age group. The age-standardized prevalence was approximately 1.5 times higher in females than in males (698 persons in males vs. 1,040 persons in females). Among the specific TMD subtypes, the age-standardized prevalence of internal derangement of the temporomandibular joint and pain in the temporomandibular joint, not classified elsewhere, was higher than that of other specific TMDs.

Conclusion: The overall age-standardized prevalence of TMD was higher in the 10s, 20s, and 30s age groups and in females between 2012 and 2020. The age-standardized prevalence of internal derangement of temporomandibular joint was the highest among specific TMD subtypes.

Keywords: Korea; Prevalence; Temporomandibular joint disorders

INTRODUCTION

The temporomandibular joint is the hinge that connects the mandible to the temporal bone of the skull. Temporomandibular disorders (TMD) can arise from various factors, including poor eating habits involving hard and chewy foods, trauma from accidents or injuries, misalignment,
and psychological factors such as stress, anxiety, depression, tension, and nervousness. Environmental influences, such as chronic exposure to vibrations and noise, and social issues, such as legal disputes and familial or working discord, can also contribute to TMD. A characteristic symptom of TMD is pain, which is often felt in the mandible and chewing muscles in front of both ears during activities, such as chewing food, yawning, or opening the mouth. Patients may also experience joint sounds and restricted mouth and jaw movements.

TMD can be classified into joint issues, such as disc displacement, arthritis, dislocation, and stiffness. Muscle-related problems include tension or fascia pain due to muscle fatigue, myositis from trauma or infection, and muscle spasms from central causes or electrolyte imbalance. This muscle pain can severely limit mouth opening and chewing, and may radiate to the neck, shoulders, and head. Preventing and treating TMD early is crucial for the effective management of the disorder. Despite its significance, few studies have investigated the prevalence of TMD in the Korean population. The Korea National Health Insurance Service (KNHIS) has provided data on TMD treatments over the last 10 years (2012 to 2020). This study analyzed these data to determine the age-standardized prevalence of TMD in South Korea.

METHODS

Study population
We utilized cohort data from the KNHIS spanning 2012 to 2020. The KNHIS is the sole insurance provider of 97% of the Korean population. In 2020, the KNHIS database included records for 51,344,938 individuals. Medical aid recipients under the KNHIS were excluded from the analysis. Medical aid is a program designed to assist individuals experiencing financial difficulties and is governed by the Medical Aid Act, which aims to enforce public health and promote social welfare. Primary diagnoses were extracted from the KNHIS system records, which detailed primary diagnoses based on complaints and symptoms [1]. The data consisted of primary diagnoses related to TMD according to the 10th revision of the International Classification of Diseases and Related Health Problems (ICD-10: K07.6):

- Internal derangement of temporomandibular joint (ICD-10: K07.60)
- Snapping jaw (ICD-10: K07.61)
- Recurrent dislocation and subluxation of temporomandibular joint (ICD-10: K07.62)
- Pain in temporomandibular joint, not elsewhere classified (ICD-10: K07.63)
- Stiffness of temporomandibular joint, not elsewhere classified (ICD-10: K07.64)
- Degenerative joint disease of temporomandibular joint (ICD-10: K07.65)
- Masticatory muscle disorders (ICD-10: K07.66)
- Other specified temporomandibular joint disorder, not elsewhere classified (ICD-10: K07.68)
- Temporomandibular joint disorder, unspecified (ICD-10: K07.69)

Definition of variables
Age was categorized into the following groups: 0–9, 10–19, 20–29, 30–39, 40–49, 50–59, 60–69, 70–79, and 80 years or older.

Statistical methods
The age-standardized prevalence of TMD by sex was calculated using the direct method, referencing the beneficiaries of Health Insurance from the Korean National Health Insurance Statistical Yearbook from 2012 through 2020 and the estimated Korean population in 2020 was used as a reference [2,3].

Ethics statement
The Institutional Review Board of the Samsung Medical Center granted an exemption for the study protocol (IRB No. 2022-07-185). This exemption was granted because the study was anonymized, posing no more than minimal risk to the participants. The waiver of consent did not negatively affect the rights or well-being of the participants, as obtaining consent was impractical within the research timeframe. There is no reason to believe that any participant would object to participation, and the associated risk remains extremely low without obtaining consent.

RESULTS
The age-standardized prevalence of TMD increased from 604 persons per 100,000 persons in 2012 to 869 persons per 100,000 persons in 2020 (Fig. 1A). In 2020, the prevalence was 1,355 persons per 100,000 persons in the 10–19 years age group, 1,809 persons per 100,000 persons in the 20–29 years age group, and 979 persons per 100,000 persons in the 30–39 years age group. The prevalence was approximately 1.5 time higher in females than in male (698 persons per 100,000 persons in males vs. 1,040 persons per 100,000 persons in females) (Fig. 1B-D, Supplementary Table 1).

Fig. 2 shows the age-standardized prevalence of specific
TMD. ‘Internal derangement of temporomandibular joint,’ ‘pain in temporomandibular joint, not elsewhere classified,’ and ‘other specified temporomandibular joint disorder, not elsewhere classified’ demonstrated higher prevalence rates than those of other specific TMDs (Fig. 2, Supplementary Tables 2-10).

DISCUSSION

This study demonstrated the age-standardized prevalence of TMD and its specific subtypes across all age groups. The prevalence of TMD notably increased among individuals in their teens, twenties, and thirties, with a particularly sharp increase among those in their twenties. The prevalence is higher in females than in males. There are few comparable studies utilizing large-scale national health data, but our findings align with the existing research on TMD. An Italian study involving 4,299 adults with TMD found a higher proportion of affected young adults than affected middle-aged and older adults group, with 60.5% of the patients being women [4]. Similarly, an observational study of 254 Korean patients indicated a higher proportion of women [5]. Another observational study involving 112 Brazilian patients also reported a higher proportion of women [6]. Review articles have consistently shown a higher distribution among women [7,8]. We propose that TMD may have a degenerative component, as evidenced by the highest prevalence rates in teens, people in their twenties, and people in their thirties, with a steady prevalence from people in their forties to people in their seventies. This study presents the age-standardized prevalence rates of TMD using ICD-10 codes. ‘Internal derangement of temporomandibular joint’ and ‘pain in temporomandibular joint, not elsewhere classified’ were the most prevalent among specific TMD subtypes. However, no previous study has used large-scale health data to compare specific TMD subtypes.

This study had several limitations. First, the data included only major TMD diagnoses and did not consider other factors, such as multiple conditions, disease severity, or symptoms, such as pain, headache, and jaw noises. Consequently, the prevalence of TMD in the present study may have been either underestimated or overestimated. Second, the KNHIS records may have missed patients with TMD who did not use medical services or those who paid for their own medical expenses. Third, due to data limitations, we could not show the results of panoramic dental radiography, standard dental X-ray, and/or cone-beam computed tomography imaging related to TMD.

Fig. 1. Age-standardized prevalence of temporomandibular joint disorders overall and by sex (unit: persons/100,000 persons). (A) Temporomandibular joint disorders overall, by sex, and by year. (B) Temporomandibular joint disorders by year and age group overall. (C) Temporomandibular joint disorders by year and age group in males. (D) Temporomandibular joint disorders by year and age group in females.
Fig. 2.

K07.60

ICD-10 code

<table>
<thead>
<tr>
<th>Overall</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal derangement of temporomandibular joint, overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal derangement of temporomandibular joint, male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal derangement of temporomandibular joint, female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snapping jaw, overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snapping jaw, male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snapping jaw, female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurrent dislocation and subluxation of temporomandibular joint, overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurrent dislocation and subluxation of temporomandibular joint, male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurrent dislocation and subluxation of temporomandibular joint, female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain in temporomandibular joint, not elsewhere classified, overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain in temporomandibular joint, not elsewhere classified, male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain in temporomandibular joint, not elsewhere classified, female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stiffness of temporomandibular joint, not elsewhere classified, overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stiffness of temporomandibular joint, not elsewhere classified, male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stiffness of temporomandibular joint, not elsewhere classified, female</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued to the next page)

https://doi.org/10.23838/pfm.2024.00079
Fig. 2. (Continued) Age-standardized prevalence of specific temporomandibular joint disorders overall, by age group, sex and year (unit: persons/100,000 persons). (A) Internal derangement of temporomandibular joint (International Classification of Diseases 10th Revision [ICD-10]: K07.60) by year and age group overall. (B) Internal derangement of temporomandibular joint (ICD-10: K07.60) by year and age group in males. (C) Internal derangement of temporomandibular joint (ICD-10: K07.60) by year and age group in females. (D) Snapping jaw (ICD-10: K07.61) by year and age group overall. (E) Snapping jaw (ICD-10: K07.61) by year and age group in males. (F) Snapping jaw (ICD-10: K07.61) by year and age group in females. (G) Recurrent dislocation and subluxation of temporomandibular joint (ICD-10: K07.62) by year and age group overall. (H) Recurrent dislocation and subluxation of temporomandibular joint (ICD-10: K07.62) by year and age group in males. (I) Recurrent dislocation and subluxation of temporomandibular joint (ICD-10: K07.62) by year and age group in females. (J) Pain in temporomandibular joint, not elsewhere classified (ICD-10: K07.63) by year and age group overall. (K) Pain in temporomandibular joint, not elsewhere classified (ICD-10: K07.63) by year and age group in males. (L) Pain in temporomandibular joint, not elsewhere classified (ICD-10: K07.63) by year and age group in females. (M) Stiffness of temporomandibular joint, not elsewhere classified (ICD-10: K07.64) by year and age group overall. (N) Stiffness of temporomandibular joint, not elsewhere classified (ICD-10: K07.64) by year and age group in males. (O) Stiffness of temporomandibular joint, not elsewhere classified (ICD-10: K07.64) by year and age group in females. (P) Degenerative joint disease of temporomandibular joint (ICD-10: K07.65) by year and age group overall. (Q) Degenerative joint disease of temporomandibular joint (ICD-10: K07.65) by year and age group in males. (R) Degenerative joint disease of temporomandibular joint (ICD-10: K07.65) by year and age group in females. (S) Masticatory muscle disorders, overall. (T) Masticatory muscle disorders, male. (U) Masticatory muscle disorders, female. (V) Other specified temporomandibular joint disorder, not elsewhere classified, overall. (W) Other specified temporomandibular joint disorder, not elsewhere classified, male. (X) Other specified temporomandibular joint disorder, not elsewhere classified, female.
In conclusion, the overall age-standardized prevalence of TMD was higher in the 10s, 20s, and 30s age groups and in females between 2012 and 2020. Among specific TMDs, the age-standardized prevalence of ‘internal derangement of temporomandibular joint’ was the highest. This study successfully established baseline data on degenerative TMD in a large population across all age groups, providing valuable insight into the distribution of TMD based on sex and age groups.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

ORCID

Shin Yi Jang https://orcid.org/0000-0003-4319-7029
Su Ra Seo https://orcid.org/0000-0002-9118-5682
Seong Kyong Kim https://orcid.org/0009-0003-3928-2850
Kyeongsug Kim https://orcid.org/0000-0002-0249-9103

AUTHOR CONTRIBUTIONS

Conception or design: SYJ, SRS.
Acquisition, analysis, or interpretation of data: SYJ, SRS, SKK, KK.
Drafting the work or revising: SYJ, SRS, SKK, KK.
Final approval of the manuscript: SYJ, SRS, SKK, KK.

REFERENCES

3. National Health Insurance Service. 2020 National health insurance statistical yearbook [Internet]. National Health Insurance Service; 2021 [cited 2024 Jun 18]. Available at https://www.nhis.or.kr/nhis/together/wbhaec06300m01.do?mode=view&articleNo=10812384&article.offset=0&articleLimit=10