

# Period Prevalence of Major Comorbidities Following the Diagnosis of Graves' Disease: A Nationwide Cohort Study in South Korea

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## Introductions

- Graves' disease (GD) is an autoimmune disorder and the most common cause of hyperthyroidism.
- Objectives:** This study aimed to assess the period prevalence of six major comorbidities among newly diagnosed GD patients and examine sex-specific differences.

## Methods

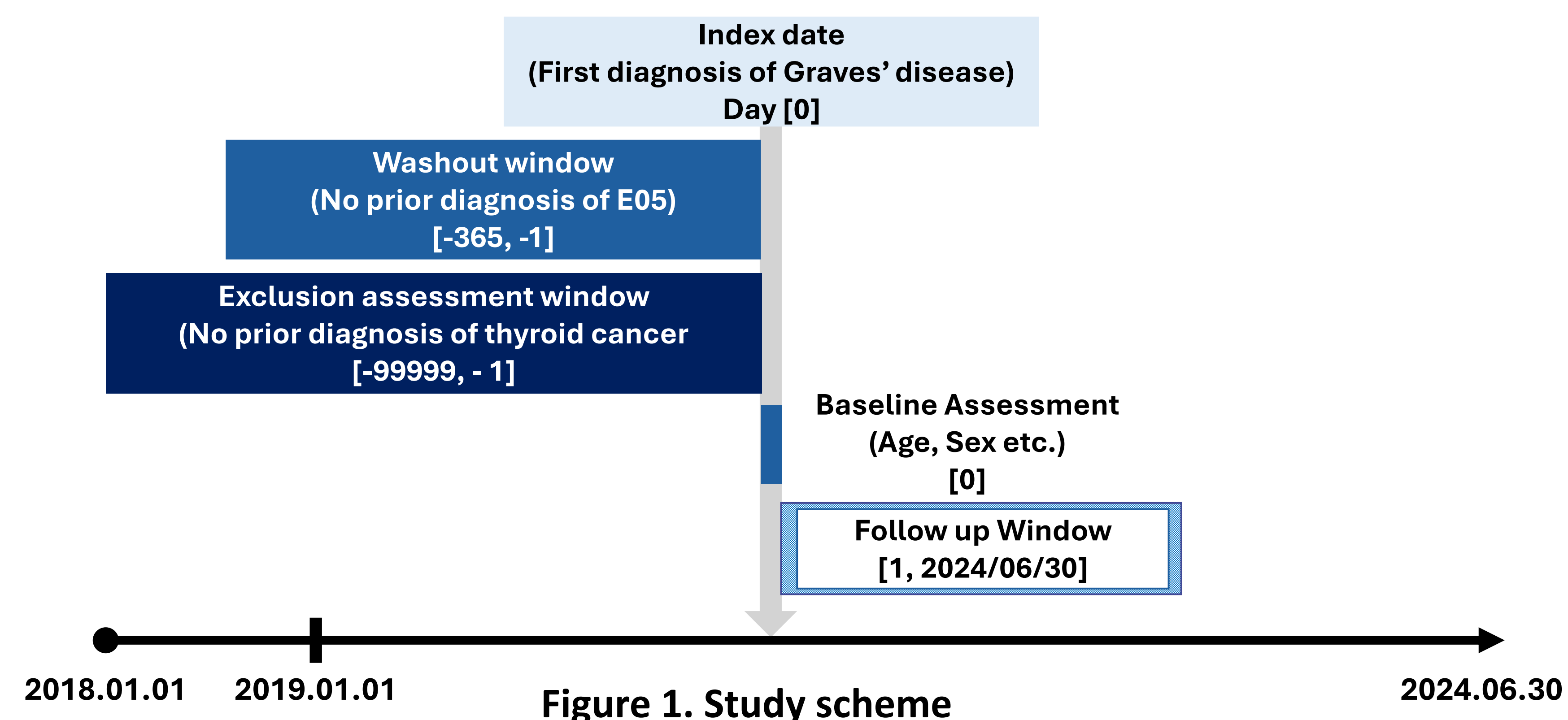
**Study design:** Retrospective cohort study

**Data source**

- The Health Insurance Review and Assessment database representative of the whole Korean population from January 1, 2018, to June 30, 2024

**Study Population**

- Patients newly diagnosed with GD between January 1, 2019 and December 31, 2023 (Figure 1)
  - Newly diagnosed GD was defined as ≥ 2 claims with ICD-10 code E05 recorded in any diagnosis position, together with cumulative antithyroid drug use ≥ 180 days
- Patients with thyroid cancer were excluded using ICD-10 code C73



**Outcome:** Period prevalence of six major comorbidities

- Period prevalence was calculated as the proportion of newly diagnosed GD patients with each comorbidity during the follow-up period.

$$\text{Period prevalence (\%)} = \frac{\text{Patients with each comorbidity during follow-up}}{\text{Newly diagnosed GD patients}} \times 100\%$$

- Comorbidities were identified using ICD-10 codes recorded in any diagnosis position: Graves' orbitopathy, atrial fibrillation or flutter, hospitalized heart failure, osteoporosis, fractures, and autoimmune diseases.

## Results

### Baseline characteristics

- A total of 136,623 patients newly diagnosed with GD were included. The mean age at diagnosis was 48.07 years, and 69.4% of patients were female (Table 1).

Table 1. Baseline characteristics

	Overall (n= 136,623)	Male (n = 41,789)	Female (n = 94,834)
Age, mean (SD)	48.07 (16.07)	47.96 (14.84)	48.08 (16.59)
Age group, n (%)			
< 30	18,916 (13.8)	4,877 (11.7)	14,039 (14.8)
30-39	22,034 (16.1)	7,089 (17.0)	14,945 (15.8)
40-49	28,929 (21.2)	9,888 (23.7)	19,041 (20.1)
50-59	32,833 (24.0)	10,276 (24.6)	22,557 (23.8)
60-69	22,391 (16.4)	6,998 (16.7)	15,393 (16.2)
≥ 70	11,520 (8.4)	2,661 (6.4)	8,859 (9.3)
Index year, n (%)			
2019	31,698 (23.2)	9,701 (23.2)	21,997 (23.2)
2020	28,377 (20.8)	8,599 (20.6)	19,778 (20.9)
2021	28,922 (21.2)	8,798 (21.1)	20,124 (21.2)
2022	24,909 (18.2)	7,701 (18.4)	17,208 (18.2)
2023	22,717 (16.6)	6,990 (16.7)	15,727 (16.6)
Insurance type, n (%)			
National Health Insurance	132,144 (96.7)	40,362 (96.6)	91,782 (96.8)
Medical Aid (I, II)	4,440 (3.3)	1,391 (3.3)	3,049 (3.2)
Others (Veterans Affairs etc.)	39 (0.0)	36 (0.1)	3 (0.0)

### Overall period prevalence of major comorbidities

- Osteoporosis was the most prevalent comorbidity (15.49%), followed by autoimmune diseases (9.24%) (Figure 2).

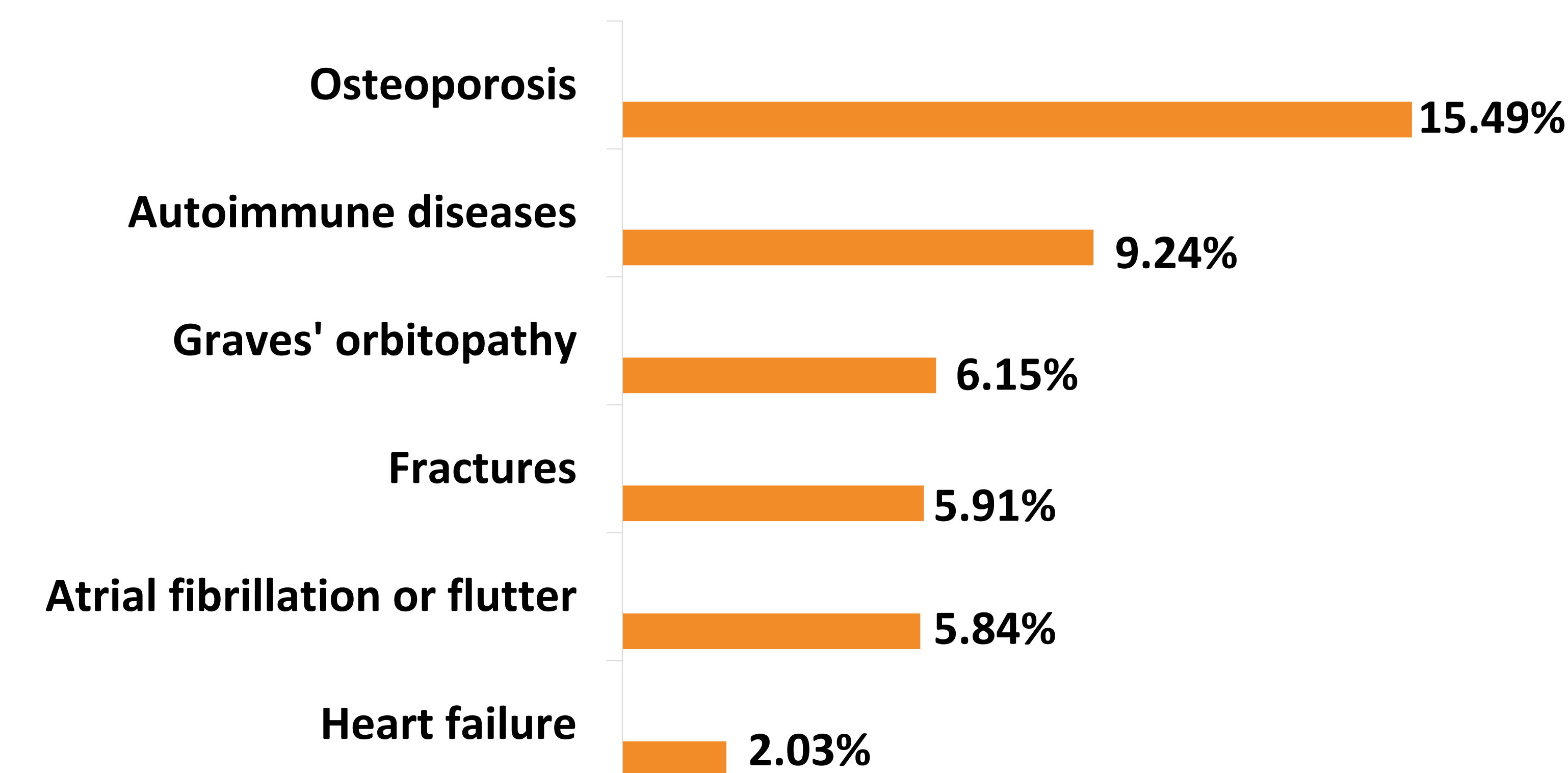


Figure 2. Overall prevalence of comorbidities

### Sex-specific period prevalence of major comorbidities

- Most comorbidities showed significant sex-specific differences, except for heart failure (Table 2).
- Osteoporosis showed the largest sex differences, with higher prevalence among female patients.
- Atrial fibrillation or flutter was more prevalent among male patients.

Table 2. Sex-specific period prevalence of comorbidities

	Male (n = 41,789)	Female (n = 94,834)	P-value
Graves' orbitopathy	2,235 (5.35)	6,161 (6.50)	<0.001
Atrial fibrillation or flutter	3,557 (8.51)	4,420 (4.66)	<0.001
Heart failure	840 (2.01)	1,928 (2.03)	0.782
Osteoporosis	1,777 (4.25)	19,392 (20.45)	<0.001
Fractures	1,948 (4.66)	6,133 (6.47)	<0.001
Autoimmune diseases	3,019 (7.22)	9,599 (10.12)	<0.001

## Discussion

### Limitation

- Comorbidities were identified using claims-based ICD-10 codes, and follow-up duration varied by index date. Therefore, the estimates should be interpreted as post-index prevalence.

### Study implications

- These findings suggest the need for sex-specific assessment and monitoring of comorbidities among patients newly diagnosed with GD.
- Further studies are needed to evaluate the incidence and timing of comorbidities following GD diagnosis.

## Conclusions

- Major comorbidities, including ophthalmologic, cardiovascular, skeletal, and autoimmune conditions, were identified among patients with GD.
- The prevalence of these comorbidities differed by sex, highlighting the importance of considering sex differences in the clinical assessment of patients with GD.

## References

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 2. Ahn HY, Cho SW, Lee MY, et al. Prevalence, Treatment Status, and Comorbidities of Hyperthyroidism in Korea from 2003 to 2018: A Nationwide Population Study. Endocrinol Metab (Seoul). 2023;38(4):436-444. doi:10.3803/EnM.2023.1684

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