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## Introduction

- Vertigo is a common yet challenging presenting complaint in medicine
- It is estimated that ~ 1.5 million Canadians suffer from vertigo [1]
- Common causes of vertigo are related to **inner ear balance** or **systemic insults** [2]
- In 2020, a patient presented with **vertigo with initially no cause** and with completely normal vestibular tests – upon further testing, it was found she was also **hypothyroid**.
- Curiously, the patient's vertigo only **ceased when treated for her thyroid**
- As hypothyroidism and vertigo are a **rare clinical association**, the aim of this scoping review of literature is to evaluate the **association between hypothyroidism and vertigo**.

## Methods



- Case report: **verbal consent** obtained
- Scoping review strategy: **PRISMA-ScR checklist**
- Studies identified through e-searches of 5 databases with citation searches: OVID, PubMed, Cochrane, Embase, and CINAHL
- **Inclusion** criteria: min. 1 case of hypothyroidism-related vertigo in both pediatric and adult populations
- **Exclusion** criteria: abstracts and conference proceedings, nonhuman studies or foreign language
- Population demographics, **thyroid & vestibular exams performed, treatment offered** and response to treatment, theories proposed

## Results

### Case Report

- **15F** competitive speed skater
- Chief complaint: **3 mo. history of vertigo**
- No headache/otologic sx
- ROS: fatigue and menorrhagia
- No FMHx thyroid disease
- **O/E:** all vestibular testing normal
- **Labs:** Iron profile & CBC WNL. **TSH : 10.2 mIU/L**
- Tx: Synthroid
- Patient **euthyroid & symptom-free** after 4 mo

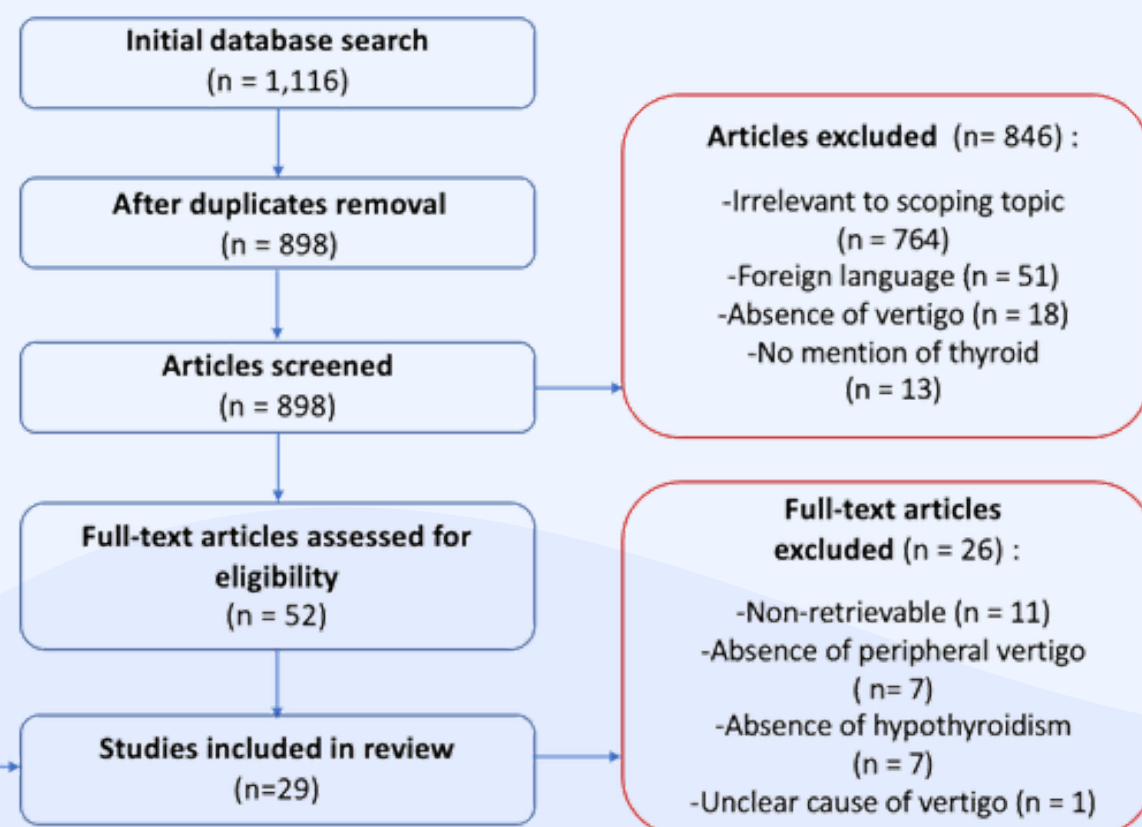


Figure 1. PRISMA flow diagram for study selection.

### Scoping Review

Publications years	1963 - 2022
Study type	24/29 papers clinical 5/29 literature reviews
Age range	8 – 85 + years old
Population focus	21/24 adult 1/24 pediatric 2/24 both
Total no. of H x V cases	2,485

Table 1. Demographics of included articles.

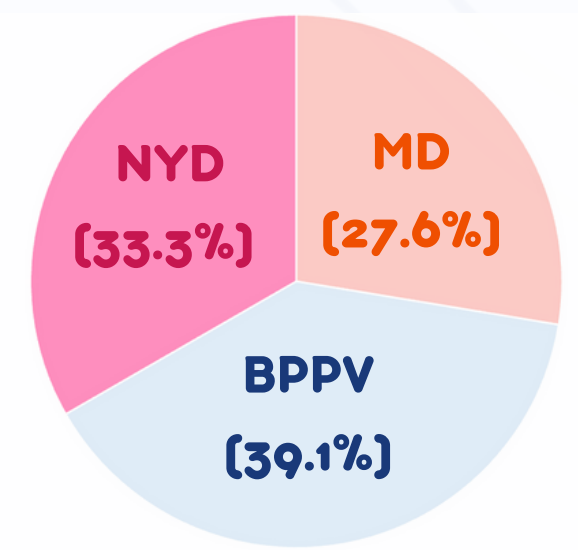


Figure 2. Vertigo class distribution.

- 13/24 studies **did not define vertigo**
- Other common ENT sx : **hearing loss, tinnitus, aural fullness, dysarthria**
- Most common thyroid tests : **TSH/T4/T3/TPOAb/TgAb**
- Most common vestibular tests: **Dix-Hallpike, neuro exam & audiometry**
- No two studies did the same thyroid & vestibular investigations



Figure 3. Effect of Synthroid on vertigo.

## Discussion

- Hypothyroidism could **modify endolymphatic flow of the inner ear**
- Inflammatory/metabolic changes --> inner ear **inflammation** --> dysregulation of endolymphatic homeostasis
  - Arrival of thyroid complexes could trigger the release of **additional cytokines** & cascade of inflammatory/immune reactions [3]
- **Thyroid x MD:** Both could derive from an **underlying common susceptibility** to autoimmune disturbance
- **Thyroid x BPPV:** thyroid autoimmunity could...
  - allow its complexes to travel through the perilymph barrier and **mimic displaced otoliths**
  - change the expression of ion transporters of the inner ear, increasing **endolymphatic volume** (Pendred-like pathway)
  - **impair circulation** of inner ear blood flow
- **Impact of Synthroid treatment:** currently **no consensus** on its effect on vertigo
  - **In MD:** mixed response. Some studies demonstrate symptomatic control of vertigo, while other studies show that thyroid dysfunction increases
  - **In BPPV:** there is an increased risk of recurrence of BPPV in patients with a history of hypothyroidism on Synthroid [4]



Figure 4. Demonstration of the process of **otolith-like thyroid autoimmune complexes** in the SCC, triggering BPPV.

## Limitations

- **Heterogeneity** of the definition of vertigo
- Significant **heterogeneity** in age & gender distribution
- **Heterogeneous design & methodology** (especially in **thyroid and vestibular tests**)
- Review limited by a **small number of studies & small sample size** of patients actively being treated with **Synthroid**

## Conclusion

- **1st scoping review** of hypothyroidism x vertigo covering vertigo NYD, MD, BPPV, Synthroid effect
- More studies are supporting the role of **thyroid autoimmune processes** as a causative factor in **vestibular conditions**
- Next step: cohort studies testing **thyroid hormone levels in dizzy patients**
- Next step: administering the **Dizziness Handicap Inventory** to hypothyroid pts

### REFERENCES

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