World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(CASE REPORT)

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Potential link between vaping and hypothyroidism: A case report

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World Journal of Biology Pharmacy and Health Sciences, 2024, 20(03), 395–397

Publication history: Received on 28 September 2024; revised on 11 November 2024; accepted on 13 November 2024

Article DOI: https://doi.org/10.30574/wjbphs.2024.20.2.0892

Abstract

Background: Vaping has gained popularity as an alternative to traditional smoking, but its potential health effects, particularly on endocrine function, remain under-explored. This case report highlights a possible association between vaping and the development of subclinical hypothyroidism in a young adult female.

Case Presentation: A 25-year-old female with a history of vaping for 30 minutes daily over the course of one year presented with symptoms of fatigue, weight gain, and dry skin. Initial thyroid function tests showed elevated TSH (5.08 uIU/mL), reduced T3 (64 ng/dL), and T4 (4.8 ug/dL), consistent with subclinical hypothyroidism. After discontinuing or reducing vaping, repeat thyroid function tests revealed an improvement in thyroid hormone levels (TSH: 4.69 uIU/mL, T3: 136.4 ng/dL, T4: 5.77 ug/dL) and symptom relief. The use of a vaping device with a lithium-ion battery raised concerns about possible lithium exposure, a known factor in thyroid dysfunction.

Conclusion: This case suggests a potential reversible association between vaping and subclinical hypothyroidism, possibly exacerbated by lithium toxicity from battery leakage. Further research is necessary to understand the mechanisms behind vaping-related thyroid dysfunction and the potential role of lithium in this process.

Keywords: Vaping; Hypothyroidism; Lithium toxicity; Thyroid dysfunction; Nicotine; Subclinical hypothyroidism.

1. Introduction

Vaping, a practice involving the inhalation of aerosolized substances via electronic nicotine delivery systems (ENDS), has surged in popularity, particularly among young adults.[1] While vaping has been marketed as a safer alternative to smoking, its long-term health effects remain under investigation.[2,3] Emerging evidence suggests that vaping may affect not only the respiratory and cardiovascular systems but also endocrine function. Hypothyroidism, a common thyroid disorder characterized by insufficient thyroid hormone production, has rarely been associated with vaping.[2] This case report presents a 25-year-old female who developed subclinical hypothyroidism potentially linked to her daily vaping habit.

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2. Case Presentation

2.1. Patient Background

A 25-year-old female presented to the outpatient clinic with complaints of persistent fatigue, weight gain of approximately 5 kg over the past six months, dry skin, and mild hair thinning. She denied any significant past medical history or family history of thyroid disorders. The patient had no history of smoking, alcohol consumption, or recreational drug use. However, she reported a history of daily vaping for nearly one year. Her vaping device contained nicotine and was powered by a rechargeable lithium-ion battery. She used the device for an average of 30 minutes per day.

The patient had not experienced any recent illness, changes in diet, or new medications. There were no symptoms of palpitations, heat intolerance, or tremors to suggest hyperthyroidism. Her menstrual cycles were regular. Given her symptoms and lifestyle factors, thyroid function tests were performed.

2.2. Investigations (Before Stopping Vaping)

- TSH: 5.08 uIU/mL (Reference range: 0.4-4.0 uIU/mL)
- T3: 64 ng/dL (Reference range: 80-200 ng/dL)
- T4: 4.8 ug/dL (Reference range: 5-12 ug/dL)

The results indicated subclinical hypothyroidism, characterized by elevated TSH and slightly low T3 and T4 levels. Further tests for thyroid antibodies, including anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin antibodies, were negative, ruling out autoimmune thyroiditis.

2.2.1. Management

Considering the patient's daily use of a vaping device and the absence of other risk factors, she was advised to discontinue vaping or at least significantly reduce her usage. No pharmacological treatment was initiated, and the patient was educated about lifestyle modifications, including maintaining a healthy diet and regular exercise, to help manage her symptoms.

2.3. *Follow-up Investigations* (After Stopping/Reducing Vaping)

Three months after stopping or significantly reducing vaping, the patient returned for follow-up. She reported improvement in her symptoms, including better energy levels, stable weight, and improved skin texture. Repeat thyroid function tests revealed:

- TSH: 4.69 uIU/mL
- T3: 136.4 ng/dL
- T4: 5.77 ug/dL

The improvement in TSH, T3, and T4 levels suggested a partial resolution of thyroid dysfunction following vaping cessation.

3. Discussion

This case highlights a possible association between vaping and the development of subclinical hypothyroidism. Although thyroid dysfunction has not been widely reported as a consequence of vaping, there are plausible mechanisms by which vaping could affect thyroid function.

Nicotine exposure from vaping has been shown to influence the hypothalamic-pituitary-thyroid (HPT) axis. Nicotine may alter the release of thyroid hormones, which could account for the observed changes in TSH, T3, and T4 levels in this patient. Additionally, electronic vaping devices contain various chemical components, including heavy metals and volatile organic compounds, that could potentially interfere with thyroid function.

Another intriguing aspect of this case is the suspicion of lithium toxicity. The patient's vaping device was powered by a lithium-ion battery, raising concerns about the possibility of lithium exposure through battery leakage. Lithium is a well-known inhibitor of thyroid hormone synthesis and release and has been implicated in the development of hypothyroidism in individuals on long-term lithium therapy for psychiatric conditions.[4] Although no direct evidence

of battery leakage was identified in this case, the possibility of low-level lithium exposure through vaping devices warrants further exploration.

3.1. Potential Mechanism

Nicotine Exposure: Nicotine has been shown to affect thyroid function by increasing sympathetic activity, which can alter the regulation of the HPT axis. Chronic exposure may suppress the release of thyroid hormones, contributing to hypothyroidism.

Lithium Toxicity: Lithium can inhibit thyroid hormone synthesis by interfering with iodine uptake and thyroglobulin iodination. It can also inhibit the release of thyroid hormones into circulation, leading to elevated TSH levels and reduced T3 and T4.[4]

4. Conclusion

This case presents a unique potential association between daily vaping and subclinical hypothyroidism in a young adult female. The improvement in thyroid function following cessation of vaping suggests a reversible component to the thyroid dysfunction. While nicotine exposure is a plausible cause, the potential for lithium toxicity from vaping devices powered by lithium-ion batteries must also be considered. Further studies are needed to explore the endocrine effects of vaping and to assess the safety of vaping devices in relation to thyroid health.

Clinicians should remain vigilant in assessing patients who vape, especially those presenting with unexplained thyroid dysfunction, and consider vaping as a potential risk factor for endocrine abnormalities.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from the individual included in the study.

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