JIM Research Letter

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Trends in celiac disease autoimmunity before and after the COVID-19 pandemic

In Alberta, Canada, rates of testing for celiac disease (CeD) based on tissue transglutaminase antibodies (tTG-IgA) remained stable from 2012 to 2019; however, incidence of CeD autoimmunity increased by 6% per year from 31.5 per 100,000 person-years in 2015 to 40.3 per 100,000 person-years in 2019 [1]. As healthcare systems shifted resources to prioritizing the COVID-19 pandemic, delivery of primary care including nonurgent laboratory testing was reduced. It is therefore important to understand if and how trends in the incidence of CeD autoimmunity since 2019 may have been affected by delays in testing for chronic diseases.

We developed a retrospective, population-based cohort using health administrative data from Alberta, which is a province in Canada with approximately 4.4 million residents. There is universal healthcare coverage for >99% of residents, including laboratory testing, primary care, emergency visits, and hospital admissions. Accordingly, this data source is essentially comprehensive of healthcare interactions in a publicly funded system.

All records for tTG-IgA were identified in Alberta between April 2012 and March 2025 from a province-wide laboratory database. Incident cases of CeD autoimmunity were defined as unique individuals newly positive for tTG-IgA between April 2015 and March 2025. Rates of CeD autoimmunity were analyzed by quarter to capture variation within years while balancing stability of estimates. Trends for two time periods—April 2015 to December 2019 (pre-pandemic) and January 2021 to March 2025 (post-pandemic)—were modeled using negative binomial regression while incorporating the population at-risk as an offset term. Given the different trends in prior incidence of CeD autoimmunity in Alberta [1], analyses were stratified into pediatrics and adults. Average percentage changes across quarters in the two time periods were estimated from the model. Statistical analyses were performed in RStudio using the *MASS* package [2]. Further details on the methods are provided in the Supplement.

Observed incidence of CeD autoimmunity in children ranged between 27.5 (April–June 2020) and 110.2 (January–March 2023) per 100,000 person-years (Fig. 1a). Although incidence rates were notably higher in the post-pandemic period, there was no significant difference between the two trends ($p = 0.796$). On average, pediatric incidence increased per quarter by 1.22% (95% CI: 0.08, 2.37) prior to the pandemic versus 1.45% (95% CI: −0.61, 3.55) in the post-pandemic period. Similar findings were observed when restricted to those with a tTG-IgA value ≥10 times the ULN (Table S1); however, a potential trend of decreasing incidence may be occurring in the last year (Fig. S1).

Incidence of CeD autoimmunity in adults ranged from 20.4 (April–June 2020) to 47.8 (April–June 2024) per 100,000 person-years (Fig. 1b). There was a statistically significant change in the trend across time between the two periods ($p < 0.001$). On average, adult incidence was stable across quarters prior to the pandemic (−0.31, 95% CI, −0.82, 0.20) while it increased by 1.74% (95% CI: 0.79, 2.71) post-pandemic. No significant difference in trends was observed among adults with tTG-IgA value ≥10 times the ULN (Table S1, Fig. S2). Interactive results are available for further detail through the "Time Series" tab via https://kaplan-global-epi-cave.share.connect.posit.cloud/.

Following the pandemic, the incidence of pediatric CeD autoimmunity appears to have continued a similar increasing trend that was occurring prior to the pandemic. Actual rates of adult CeD autoimmunity in the post-pandemic era were similar to prior estimates; however, trends showed rising incidence in recent years. The trends in both populations since the pandemic could be indicative of delayed diagnoses or identification of potential CeD "catching up" once healthcare utilization stabilized. In cases where a diagnosis

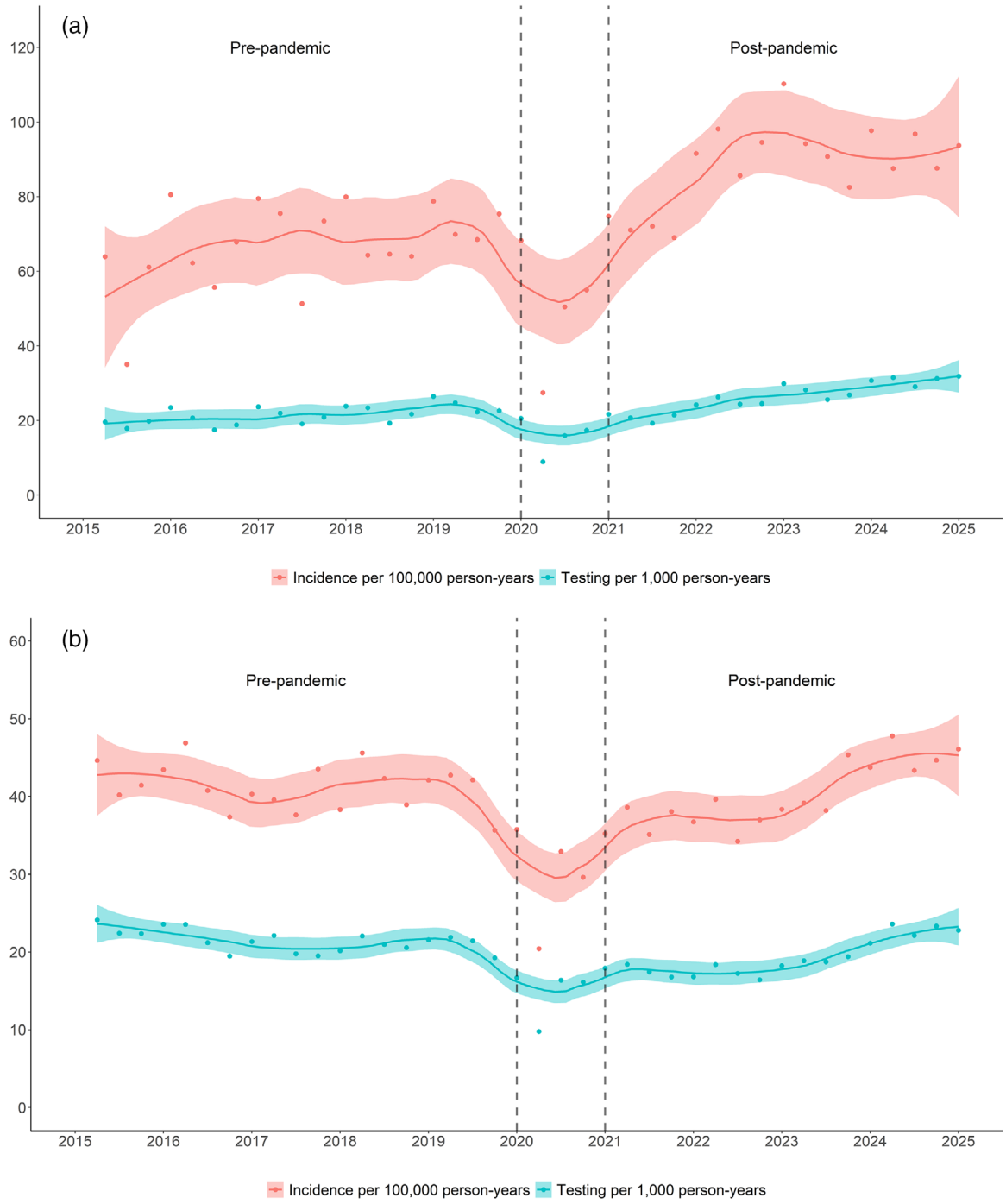

Fig. 1 *Trends in the incidence of celiac disease autoimmunity in children (a) and adults (b) relative to the COVID-19 pandemic.*

was delayed from these changes, further monitoring is recommended to assess whether there is an increased risk of adverse outcomes because of further intestinal damage. For example, Italy and Sweden similarly saw a reduction in diagnostic procedures/testing for and incidence of CeD before and after the pandemic began [3, 4].

Alternatively, the risk of developing autoimmune disorders following infection from SARS-CoV-2 could explain increased CeD autoimmunity; for example, a 64% greater risk of incident diabetes has been observed among those who have had COVID-19 [5]. One study has shown a significant association between prior infection and subsequent CeD diagnosis (adjusted hazard ratio 2.68) [6], although this has not been corroborated in other studies [3, 7]. It is worth noting that the most recent year of our data suggests a potential stabilization of incidence rates in children, after a potential peak in 2023 where rates exceeded 100 per 100,000 person-years. Further surveillance of CeD diagnoses in the coming years will establish whether a continued increase of pediatric CeD autoimmunity will persist, or if a plateau is on the horizon that has been reported in other settings [8, 9].

Author contributions

James A. King: Writing—original draft; visualization; methodology; investigation; data curation; formal analysis; conceptualization. **Stephanie Coward**: Writing—review and editing; methodology; investigation. **Jenny Godley**: Writing—review and editing; investigation. **Amy Metcalfe**: Writing—review and editing; methodology; investigation. **Paul E. Ronksley**: Writing—review and editing; investigation. **Tyler Williamson**: Writing—review and editing; methodology; investigation; supervision; conceptualization. **Gilaad G. Kaplan**: Writing—review and editing; methodology; investigation; supervision; conceptualization. All authors have reviewed and approve this submission.

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Conflict of interest statement

Dr. Kaplan has received honoraria for speaking or consultancy from AbbVie, Amgen, Janssen, Pfizer, and Takeda. Dr. Kaplan received grants for research from Ferring and for educational activities from AbbVie, Bristol Myers Squibb, Ferring, Fresenius-Kabi, Janssen, Pfizer, Takeda. He shares ownership of a patent: TREATMENT OF INFLAMMATORY DISORDERS, AUTOIMMUNE DISEASE, AND PBC. UTI Limited Partnership, assignee. Patent WO2019046959A1. PCT/CA2018/051098. 7 Sept. 2018.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethics statement

This research has received approval from the Conjoint Health Research Ethics Board at the University of Calgary (REB17-1601). A waiver of consent was provided for the purposes of accessing personal identifiable health information under the conditions of section 50 of the Health Information Act of Alberta, Canada.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1: Trends analysis and average quarterly percent changes in incidence of celiac disease autoimmunity with tTG–IgA results ≥10 times the upper limit of normal before and after COVID–19 pandemic.

Figure S1: Trends in the incidence of celiac disease autoimmunity in children with tTG–IgA results ≥10 times the upper limit of normal.

Figure S2: Trends in the incidence of celiac disease autoimmunity in adults with tTG–IgA results ≥10 times the upper limit of normal.

