Exploring IL-13 Pathogenesis Association on Atopic Dermatitis and Minimal Change Disease: A TrinetX Database Analysis

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Introduction

Minimal change disease and atopic dermatitis both involve T-cell dysregulation and the release of the inflammatory cytokine interleukin-13 (IL-13). In minimal change disease, IL-13 contributes to an inflammatory cascade that damages glomerular podocytes causing proteinuria, a hallmark of nephrotic syndrome [1,3]. Atopic dermatitis similarly shares T-cell activation and the production of IL-13 as key components of the destructive pathway toward the characteristic inflammation and skin barrier dysfunction that characterize this disease [4,5]. To further elucidate the association between these two conditions, our study will investigate the prevalence of minimal change disease in patients diagnosed with atopic dermatitis compared to a control group of patients without atopic dermatitis using TrinetX, a global health research network that contains de-identified patient information from multiple electronic medical records across large healthcare organizations.

Hypothesis: Patients diagnosed with atopic dermatitis are more likely to also have minimal change disease compared to the general population, due to shared immunological pathways involving IL-13.

Methods

- Compare prevalence of MCD between two cohorts:

Cohort 1: AD (+) and index event of MCD	Cohort 2: AD (-) and index event of MCD

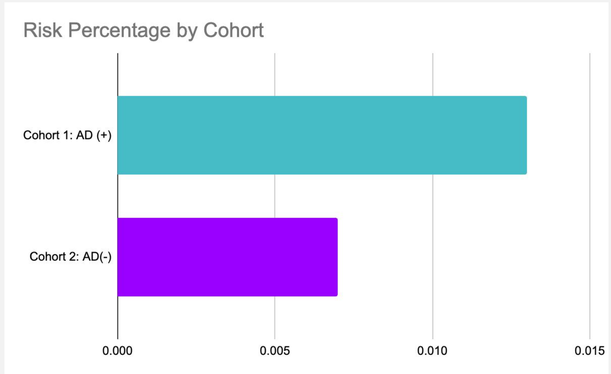
- Analysis included ICD-10 codes
  - Atopic dermatitis (UMLS:ICD10CM:L20); or
  - Atopic dermatitis, unspecified (UMLS:ICD10CM:L20.9); or
  - Other atopic dermatitis (UMLS:ICD10CM:L20.89); or
  - Intrinsic (allergic) eczema (UMLS:ICD10CM:L20.84); or
  - Flexural eczema (UMLS:ICD10CM:L20.82); or
  - Other atopic dermatitis (UMLS:ICD10CM:L20.8); or

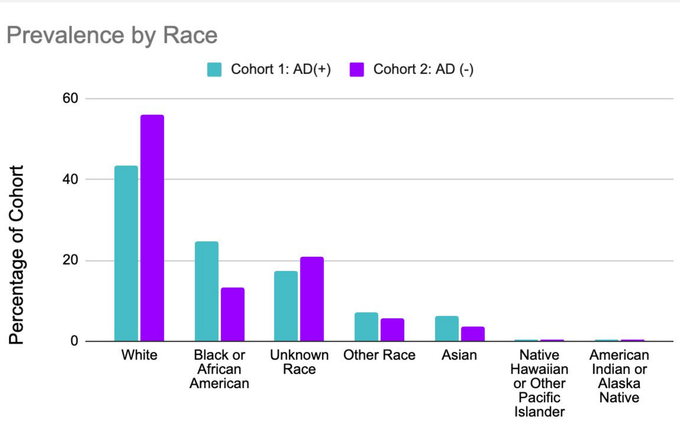
- Outcome ICD-10 codes included
  - Nephrotic syndrome with minor glomerular abnormality
  - Unspecified nephritic syndrome with minor glomerular abnormality

- Propensity score matching to pair the two cohorts for age, sex, and race

Findings

In AD (-) group, there were 86,104,202 patients, out of which 6,379 developed MCD resulting in a risk percentage of 0.007%. In AD (+) group, with 1,118,996 patients, 143 developed MCD, resulting in a higher risk percentage of 0.013%%. Risk Ratio (RR) is calculated as 1.727, with a 95% confidence interval of (1.464, 2.039).





Risk Ratio (RR)	95% CI of RR
1.727	(1.464, 2.039)

Discussion

We investigated the prevalence of minimal change disease in patients with and without atopic dermatitis. Our findings reveal a statistically significant increased prevalence of minimal change disease among patients with atopic dermatitis compared to those without.

In Cohort 1 (atopic dermatitis patients), a higher percentage of patients also had a diagnosis of minimal change disease (0.013%) when compared to Cohort 2 (non-atopic dermatitis patients) (0.007%). This equates to a Risk Ratio (RR) of 1.727, indicating a potential association between the two diagnoses. The 95% confidence interval for our risk ratio (1.474, 2.039) excludes 1.0, strengthening the evidence linking atopic dermatitis to minimal change disease.

The observed association may be attributed to the potential systemic role of IL-13 during atopic dermatitis flare-ups, altering the immune response and elevating cytokine levels. This heightened cytokine activity in atopic dermatitis may also affect the glomerulus, potentially contributing to the increased observed prevalence of minimal change disease seen in these patients. Atopic dermatitis could thus serve as a marker for a more systemic immune response in certain individuals, potentially predisposing them to an elevated risk of minimal change disease.

Limitations

The limitations of this study include limited information on data collection due to the self-limiting nature of minimal change disease. The sampled population might not be entirely representative of the broader minimal change patient population.

This study did not control for other coexisting and potentially confounding variables such as other medical conditions, or variations in treatment history.

This study was not a cohort study and thus cannot comment on the impact of atopic dermatitis on the incidence of minimal change disease.

It is also important to note the clinical significance of these findings due to the small risk percentage overall in both groups.

Future Research

- Investigate if the association between AD and MCD use holds true across different ethnicities or age groups.
- Examine environmental triggers,, that may contribute to the development of both atopic dermatitis and minimal change disease, considering how environmental factors may vary across different ethnicities or geographic regions.
- Investigate genetic factors that may predispose individuals with atopic dermatitis to develop minimal change disease, focusing on how these genetic markers vary across different ethnicities.

References

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The data used in this study was collected on April 18, 2024 from the TriNetX Network, TriNetX is the global federated health research network providing access to electronic medical records (diagnoses, procedures, medications, laboratory values, genomic information) across large healthcare organizations (HCOs). This report was run on the set of HCOs grouped into a network called US Collaborative Network. This network included 61 HCO(s).