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Original Research Article

Population study of dupuytren's contracture incidence and prevalence in patients with alcohol-related disease compared to diabetes mellitus

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Abstract

Background: Dupuytren's Contracture (DC) is a progressive fibroproliferative disorder affecting the palmar fascia, often associated with systemic conditions such as diabetes mellitus and alcohol-related diseases. While both conditions have been linked to increased risk, comparative data evaluating their relative impact on DC development remains limited.

Materials and Methods: A retrospective cohort study was conducted using the TriNetX Global Collaborative Network database, encompassing over 148 million patient records across 139 healthcare organizations from December 10, 2004 to December 10, 2024. Two cohorts were formed: one with patients diagnosed with alcohol-related disorders (n = 2, 484, 432), excluding those with diabetes, and another with diabetes mellitus (n = 9, 435, 596), excluding those with alcohol-related disorders. A 1:1 propensity score matching was performed based on age, gender, race, epilepsy, and psoriasis, resulting in two balanced cohorts of 2, 138, 531 patients each. Dupuytren's Contracture (ICD-10: M72.0) diagnosis was tracked over a 20-year follow-up.

Results: DC incidence was similar between cohorts (Alcohol: 0.264%; Diabetes: 0.275%), with a risk ratio of 0.962 (95% CI: 0.927 – 0.997, p = 0.035) and odds ratio of 0.961, indicating a slightly lower risk in the alcohol cohort. Kaplan-Meier survival analysis showed a significantly earlier onset of DC in the diabetes group (HR = 1.258, p < 0.001). Interestingly, patients with alcohol-related diseases exhibited a higher frequency of recurrent DC diagnoses (p < 0.001).

Conclusion: Although the overall risk of DC was low in both populations, diabetes mellitus was associated with earlier onset, while alcohol-related disorders were linked to higher recurrence. These findings suggest distinct pathophysiological trajectories and highlight the need for individualized screening and management strategies. Further research should explore modifiable risk factors and the molecular mechanisms underlying these associations to optimize prevention and intervention efforts.

Keywords: Dupuytrens, Contracture, Hand, Diabetes, Alcohol

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1. Introduction

Dupuytren's Contracture (DC) is a progressive fibroproliferative disorder affecting the palmar fascia of the hand. This condition is characterized by the thickening and shortening of the palmar aponeurosis, leading to flexion contractures in one or more fingers, most commonly the ring and pinky fingers.[1] The clinical implications are significant, as DC can impair hand function, reduce quality of life, and limit daily activities, particularly in severe cases.[1] The prevalence of DC varies geographically and demographically. In Europe, the lifetime risk is reported to be as high as 30% in males, while in the United States, estimates suggest a prevalence of 3% to 6% in the general population, with higher rates in older adults.[2] Furthermore, the condition predominantly affects individuals of Northern European descent and is more common in males, with a male-to-female ratio of 3:1.[3] Age is another critical factor, as the risk increases significantly after the age of 50.[4] Despite its high prevalence in certain populations, DC often remains underdiagnosed in its early stages, underscoring the need for increased awareness and early intervention.[4]

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The exact etiology of DC remains unclear, but genetic predisposition and environmental factors are believed to play pivotal roles.[5,6] Fibroblast dysfunction and the overproduction of type III collagen are central to the pathophysiology, resulting in the formation of nodules and cords in the palmar fascia. Recent studies have highlighted the role of systemic conditions, such as diabetes mellitus and alcohol-related disorders, in the development of DC[7,8,9] Diabetes is thought to contribute through mechanisms involving glycation end-products, which alter collagen structure and fibroblast activity.[10] Similarly, alcohol consumption has been linked to microvascular damage and changes in fibroblast behavior, potentially exacerbating the progression of DC.[8] Other associated factors include smoking, epilepsy, and conditions like psoriasis, which may share overlapping inflammatory or fibrotic pathways.[8,11]

Despite decades of research, significant gaps remain in our understanding of the epidemiology and pathophysiology of DC, particularly concerning its association with systemic conditions. Studies examining the prevalence of DC in patients with diabetes or alcohol-related disorders have yielded inconsistent results, with some suggesting a strong correlation and others reporting negligible associations.[8,12,13] This discrepancy may stem from methodological limitations, including small sample sizes, unadjusted confounding factors, and lack of longitudinal data. Additionally, while alcohol and diabetes are independently associated with DC, the interplay between these conditions and their combined effect on disease progression remains poorly understood.[4] Large-scale, propensity-matched cohort studies are needed to clarify these relationships and provide robust epidemiological data to inform clinical practice.

This study aims to address existing gaps in the literature by examining the incidence and prevalence of DC in patients with alcohol-related disorders and diabetes mellitus. Utilizing data from a large, multi-institutional database and employing propensity score matching, this research seeks to provide a comprehensive analysis of the association between these systemic conditions and DC. By identifying differences in risk and prevalence between these populations, the findings may enhance our understanding of DC pathogenesis, inform screening protocols, and guide the development of targeted therapeutic interventions.

2. Methods

2.1. Study design

This retrospective cohort study utilized data from the TriNetX Global Collaborative Network, comprising 139 healthcare organizations (HCOs) and providing access to electronic medical records from a total of 148,972,479 patients. Data collection spanned 20 years, from December 10, 2004, to December 10, 2024. Individuals between the ages of 0-90 years were evaluated.

Two cohorts were identified - alcohol related disorders cohort and diabetes mellitus cohort. Patients were included in the alcohol cohort if they had a diagnosis of alcohol related disorders, such as alcohol abuse (ICD-10 codes F10.1, F10.10), alcohol dependence (F10.2, F10.20), and alcoholic liver disease (K70). Patients with diabetes mellitus (ICD-10 codes E08–E13) were excluded. A total of 2,484,432 patients were included in this cohort. **(Figure 1)**

Patients were included in the diabetes mellitus cohort if they had a diagnosis of diabetes mellitus (ICD-10 codes E08–E13). Patients with alcohol-related disorders (ICD-10 codes F10, K70) were excluded. A total of 9,435,596 patients were included in this cohort. **(Figure 1)**

3. Data Analysis

To reduce confounding, a 1:1 propensity score matching was performed using the following covariates: age at index, gender, race, epilepsy, and psoriasis. Matching resulted in balanced cohorts of 2,138,531 patients each, ensuring comparability. The alcohol-related disorders cohort was reduced from 2,484,432 to 2,138,531, while the diabetes mellitus cohort was reduced from 9,435,596 to 2,138,531. **(Figure 1)**

The index event was defined as the first recorded diagnosis meeting the inclusion criteria for each cohort. The analysis follows the patients for a 20 year period from the index date.

The primary outcome of interest was the diagnosis of Dupuytren's contracture (ICD-10 code M72.0, Palmar fascial fibromatosis). TriNetX's analytical tools were used for propensity score matching and statistical analyses. Risk calculations such as absolute risk, risk difference, risk ratio, and odds ratio provided an assessment of the proportion of patients diagnosed with Dupuytren's contracture in each cohort. Survival analysis used Kaplan-Meier survival curves with long-rank testing and hazards ratios to estimate the time period to diagnose. Frequency comparisons evaluated the number of instances of Dupuytren's contracture diagnoses during the study period. Statistical significance was determined at a two-sided p-value < 0.05.

4. Results

4.1. Risk analysis

Risk analysis was conducted to compare the occurrence of Dupuytren's contracture (DD) between the two cohorts. **(Table 1)** The analysis revealed the following:

1. **Risk difference:** -0.000 ($p = 0.035$; statistically significant).
2. **Risk ratio:** 0.962 (95% CI: 0.927–0.997), suggesting a slightly lower risk of DD in the alcohol cohort compared to the diabetes cohort.
3. **Odds ratio:** 0.961 (95% CI: 0.927–0.997), confirming the lower relative risk of DD in the alcohol cohort.

4.2. Kaplan-Meier survival analysis

The Kaplan-Meier survival analysis was performed to compare survival probabilities for the occurrence of Dupuytren's contracture over 20 years. **(Table 2)**

1. **Log-Rank test:** $\chi^2 = 150.820$, $p < 0.001$ (statistically significant).
2. **Hazard ratio:** 1.258 (95% CI: 1.212–1.305), indicating that the diabetes cohort had a higher risk of developing DD earlier than the alcohol cohort.

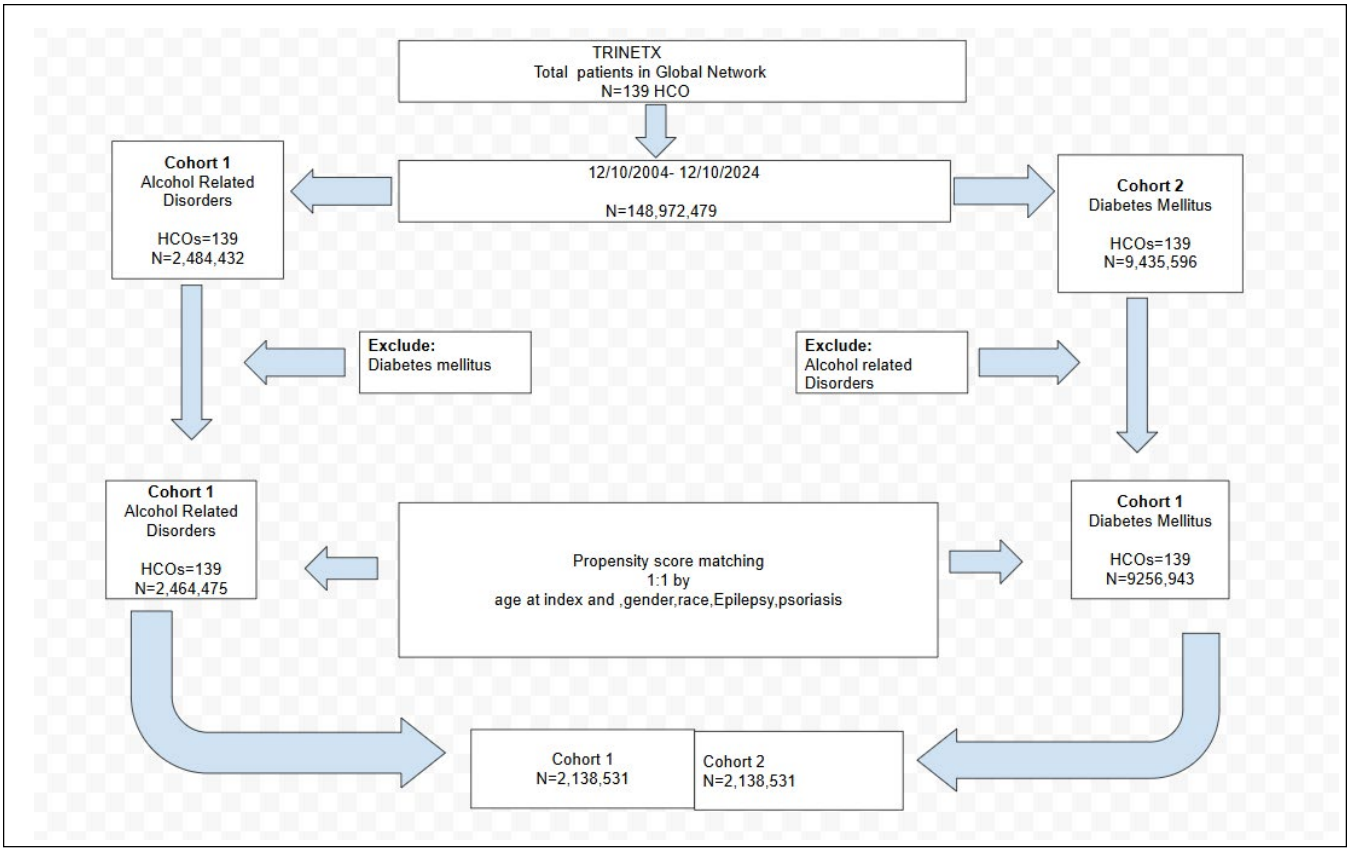

Figure 1: Flow diagram

Table 1: Risk analysis between patients with alcohol related disorders (Cohort 1) and diabetes mellitus (Cohort 2)

Cohort	Patients in cohort	Patients with outcome	Risk	95% CI
Alcohol (cohort 1)	2,138,531	5,645	0.003	
Diabetes (cohort 2)	2,138,531	5,871	0.003	

Table 2: Kaplan-Meier survival analysis comparing the probability of surviving without Dupuytren's Contracture

Cohort	Patients in cohort	Patients with outcome	Median survival (days)	Survival probability at end of time window
Alcohol (cohort 1)	2,138,531	5,645	–	98.43%
Diabetes (cohort 2)	2,138,531	5,871	–	98.08%

Table 3: Number of instances of Dupuytren's Contracture among patients with alcohol related disorders (Cohort 1) and diabetes mellitus (Cohort 2)

Cohort	Patients in cohort	Patients with outcome	Mean	Standard deviation	Median	t	df	p
Alcohol (cohort 1)	2,138,531	5,645	4.089	8.554	2	3.912	11514	0.000
Diabetes (cohort 2)	2,138,531	5,871	3.491	7.840	1			

4.3. Number of instances

The number of instances of Dupuytren's contracture was compared between the two cohorts. **(Table 3)**

4.3.1. t-Test

$t = 3.912$, $p < 0.001$ (statistically significant), indicating that patients in the alcohol cohort had more instances of DD compared to the diabetes cohort.

5. Discussion

The findings of this study analyzes the incidence and outcomes of Dupuytren's contracture over a 20-year period (December 10, 2004 to December 10, 2024) in two distinct high-risk cohorts: patients with alcohol-related diseases and those with diabetes mellitus. The data obtained by TriNetX Global Collaborative Network with propensity score matching and advanced statistical methods provided a

comprehensive overview on the risks, progression patterns, and disease frequency of both populations. While the absolute risk of Dupuytren's contracture remains low in both groups, patients with diabetes mellitus demonstrated a significantly higher hazard ratio for developing Dupuytren's contracture. In contrast, patients with alcohol-related diseases exhibited a greater frequency of recurrent episodes of Dupuytren's contracture.

Similar studies support our findings. Broekstra et al reported a stronger association with getting DC with diabetes (OR: 3.06) compared to patients with liver disease (OR: 2.92).[14] Additionally, Youngjoo et al. found that diabetics with or without complications (microvascular or end organ problems) were associated with an elevated risk (OR: 1.29-2.59) compared to patients with alcohol use disorder (OR: 1.19-1.37).[15] This strong association between Diabetes and DC demonstrates the need for preventative measures for patients with diabetes. Data from Youngjoo et al. also highlights the role of microvasculature in the condition as a whole, potentially leading to an acceleration of developing DC in diabetic patients. Considering all of these findings, research needs to be done on the possible prevention strategies for diabetic patients given their predisposition to dysfunctioning microvasculature.

Both findings suggest a need for long-term surveillance and proactive management strategies tailored to their unique disease trajectory, which is likely influenced by differences in pathophysiology or healthcare utilization patterns. Future research should focus on evaluating the impact of modifiable factors, such as glycemic control in diabetes or alcohol cessation in patients with alcohol-related diseases, on the progression and recurrence of Dupuytren's contracture. Additionally, molecular and genetic investigations may elucidate the underlying mechanisms contributing to the observed differences, potentially guiding the development of targeted therapeutic interventions.

This comprehensive analysis provides valuable insights into the epidemiology and progression of Dupuytren's contracture in two high-risk populations: alcohol use disorders and diabetes mellitus. Future action should tailor to screening, prevention, and management strategies that address specific underlying risk factors.

6. Limitations

Although propensity score matching was utilized, the potential for residual confounding cannot be excluded. Variability in diagnostic accuracy over the 20-year study period, along with advancements in healthcare practices and follow-up protocols, may have affected the validity of the findings.

7. Conclusion

This 20-year study elucidates the complex relationship between Dupuytren's contracture and two distinct yet high-risk populations: patients with alcohol-related diseases and those with diabetes mellitus. While the overall incidence of Dupuytren's contracture remained similarly low in both groups, diabetes was associated with an earlier onset, reflected by a higher hazard ratio in survival analysis. In contrast, alcohol-related diseases were linked to a higher frequency of recurrent episodes, highlighting potential differences in disease progression or patterns of healthcare engagement. These findings emphasize the need for individualized strategies in screening, prevention, and management that address the distinct pathophysiological and clinical characteristics of each population. Further investigation into the underlying mechanisms and tailored therapeutic interventions is warranted to optimize outcomes for these at-risk groups.

8. Source of Funding

None.

9. Conflict of Interest

None.

10. Ethical No.

Not required.

11. Acknowledgement

None.

12. Author Contribution:

None.

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