
# Incidence and Risk of Diseases of the musculoskeletal systems and connective tissues in Celiac Disease Patients

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## INTRODUCTION AND BACKGROUND

- Celiac disease (CD) is an autoimmune-based reaction to dietary gluten found predominantly in wheat, barley, or rye.
- The main pathogenesis occurs in the intestinal mucosa by lymphocytic infiltration with subsequent destruction of the intestinal villi architecture.

## STUDY AIM

- We aimed to identify the prevalence of diseases of the musculoskeletal system and connective tissues in hospitalized CD patients.

## METHODS

- NIS database was queried from September 2015 to December 2019 to retrieve records of patients admitted with a principal or secondary diagnosis of CD.
- We compared the incidence of diseases of the musculoskeletal system and connective tissues in CD (cases) to patients who did not have celiac disease (controls).
- Controls were 1:1 fixed ratio nearest neighbor (greedy) propensity score-matched using the patient's age, sex, and race.
- We used clinical classification software refined (CCSR) for ICD-10-CM diagnosis v2021 and identified diseases of the musculoskeletal system and connective tissues.
- We used the Rao-Scott chi-square test on the weighted sample. We used alpha = 0.01 and P value < 0.01 considered statistically significant.
- Statistical analysis is performed in R (Studio 1.4).

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## TABLES

**Table 1: Prevalence of Musculoskeletal System and Connective tissues in CD vs age-, sex-, race-matched non-CD patients, Weighted NIS 2015Q4 to 2019.**

| Variables | CD = No (n= 178584) 50% | CD = Yes (n= 178590) 50% | OR (99%CI) | P value |
|---|---|---|---|---|
| Infective arthritis | 469 (0.26%) | 424 (0.24%) | NA | 0.5029 |
| Osteomyelitis | 1665 (0.93%) | 1250 (0.69%) | 0.74 (0.60 – 0.94) | 0.0007 |
| Rheumatoid arthritis and related disease | 3600 (2.02%) | 6335 (3.55%) | 1.78 (1.58 – 2.03) | <.0001 |
| Juvenile arthritis | 70 (0.03%) | 360 (0.20%) | 5.15 (2.42 – 10.99) | <.0001 |
| Osteoarthritis | 21839 (12.2%) | 22750 (12.7%) | NA | 0.0892 |
| Tendon and synovial disorders | 910 (0.51%) | 1135 (0.64%) | NA | 0.0331 |
| Musculoskeletal pain, not low back pain | 7885 (4.41%) | 7390 (4.13%) | NA | 0.0792 |
| Spondylopathies/spondyloarthropathy | 8640 (4.84%) | 12355(6.92%) | 1.46 (1.33 – 1.61) | <.0001 |
| Osteoporosis | 5030 (2.82%) | 14160 (7.93%) | 2.97 (2.68 – 3.29) | <.0001 |
| Pathological fracture | 840 (0.47%) | 1175 (0.66%) | 1.40 (1.06 – 1.85) | 0.0018 |
| Stress fracture | 770 (0.43%) | 460 (0.25%) | 1.68 (1.19 – 2.36) | <.0001 |
| Acquired foot deformities | 585 (0.30%) | 530 (0.33%) | NA | 0.4643 |
| Scoliosis | 1515 (0.84%) | 2700 (1.52%) | 1.79 (1.48 – 2.17) | <.0001 |
| Acquired deformities (excluding foot) | 835 (0.47%) | 605 (0.33%) | 0.72 (0.53 – 0.99) | 0.0092 |
| Systemic lupus erythematosus | 2405 (1.35%) | 7640 (4.27%) | 3.27 (2.84 – 3.78) | <.0001 |
| Muscle disorders | 2875 (1.61%) | 2375 (1.33%) | 0.83 (0.70 – 0.97) | 0.0025 |
| Disorders of jaw | 230 (0.13%) | 385 (0.22%) | 1.675 (1.03 – 2.73) | 0.0059 |
| Aseptic necrosis and osteonecrosis | 500 (0.28%) | 570 (0.32%) | NA | 0.3447 |
| Gout | 3565 (1.99%) | 5080 (2.84%) | 1.44 (1.26 – 1.64) | <.0001 |
| Low back pain | 6060 (3.39%) | 7265 (4.07%) | 1.21 (1.08 – 1.35) | <.0001 |

## RESULTS

- A total of 178,590 records identified with CD in the weighted sample.
- Compared to non-CD matched patients, CD patients have an increased prevalence of the following
  - **Juvenile arthritis**
  - **Systemic lupus erythematosus**
  - **Osteoporosis**
  - **Scoliosis**
  - **Rheumatoid arthritis**
  - **Stress fracture**
  - **Spondylopathies/spondyloarthropathy**
  - **Gout**
  - **Low back pain**

CD patients are at low risk of
- **Osteomyelitis**
- **Muscle disorders**

## LIMITATIONS

- The NIS does not identify individual patients, and recurrent hospitalizations appear as distinct observations.
- Inherent design flaws of administrative databases.
- No information on celiac or rheumatological serologies
- No information on gluten compliance

## LEARNING POINTS

- CD is a multisystem autoimmune condition with clinical presentations including musculoskeletal and rheumatological complaints.
- CD appears to have an increased risk of having another autoimmune disorder, little is known about the risk factors, pathogenesis, and relationship between CD and rheumatological conditions like SLE, Spondyloarthropathies, and Gout.
- We propose screening for CD in some patients and a need for rheumatologic follow-up.