Supplementary material

This supplement contains additional tables and figures to the study by Adonis Sotoodeh, Madeleine N. Hoang, Karin Hellgren, and Anders Forss:

"Prevalence of coeliac disease in patients with systemic lupus erythematosus: a systematic review and meta-analysis"

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### Table S1

Studies included in the meta-analysis on prevalence of serological markers of coeliac disease in patients with systemic lupus erythematosus.

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients n</th>
<th>Female (%)</th>
<th>Age mean (range)</th>
<th>Antibodies</th>
<th>Seropositive (TTG/EMA) n (%)</th>
<th>Seropositive (TTG/EMA/AGA) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aikawa, 2012</td>
<td>41</td>
<td>85.4</td>
<td>14 (NA)</td>
<td>EMA</td>
<td>1 (2.4)</td>
<td>1 (2.4)</td>
</tr>
<tr>
<td>AlEnzi, 2020</td>
<td>115</td>
<td>90.4</td>
<td>27 (NA)</td>
<td>TTG/EMA/AGA</td>
<td>5 (4.3)</td>
<td>15 (13.0)</td>
</tr>
<tr>
<td>Ben Abdelghani, 2012</td>
<td>24</td>
<td>91.7</td>
<td>36 (18–52)</td>
<td>TTG/EMA/AGA</td>
<td>2 (8.3)</td>
<td>7 (29.2)</td>
</tr>
<tr>
<td>Caio, 2018</td>
<td>35</td>
<td>82.9</td>
<td>NA (NA)</td>
<td>TTG/EMA/AGA</td>
<td>1 (2.9)</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>Elhami, 2018</td>
<td>100</td>
<td>92.0</td>
<td>49 (16–76)</td>
<td>TTG</td>
<td>1 (1.0)</td>
<td>1 (1.0)</td>
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<tr>
<td>Gheita, 2012</td>
<td>10</td>
<td>80.0</td>
<td>12 (NA)</td>
<td>TTG</td>
<td>6 (60.0)</td>
<td>6 (60.0)</td>
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<tr>
<td>Mader, 2003</td>
<td>61</td>
<td>NA</td>
<td>NA (NA)</td>
<td>EMA/AGA</td>
<td>0 (0.0)</td>
<td>27 (44.3)</td>
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<td>Marai, 2004</td>
<td>100</td>
<td>88.0</td>
<td>31 (15–56)</td>
<td>TTG/EMA</td>
<td>3 (3.0)</td>
<td>3 (3.0)</td>
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<tr>
<td>Picceli, 2013</td>
<td>194</td>
<td>92.8</td>
<td>39 (17–67)</td>
<td>TTG/EMA</td>
<td>11 (5.7)</td>
<td>11 (5.7)</td>
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<tr>
<td>Rensch, 2001</td>
<td>103</td>
<td>NA</td>
<td>NA (NA)</td>
<td>EMA/AGA</td>
<td>0 (0.0)</td>
<td>24 (23.3)</td>
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<tr>
<td>Sahin, 2019</td>
<td>50</td>
<td>88.0</td>
<td>15 (NA)</td>
<td>TTG/EMA</td>
<td>3 (6.0)</td>
<td>3 (6.0)</td>
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<tr>
<td>Shamseya, 2020</td>
<td>100</td>
<td>900</td>
<td>35 (19–55)</td>
<td>TTG/EMA</td>
<td>10 (10.0)</td>
<td>10 (10.0)</td>
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<tr>
<td>Soltani, 2021</td>
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<td>81.5</td>
<td>32 (16–60)</td>
<td>TTG/EMA/AGA</td>
<td>5 (3.8)</td>
<td>6 (4.6)</td>
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Table S2 Quality assessment of included studies according to the Joanna Briggs Critical Appraisal Tool

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<tr>
<th>Author, publication year</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Total number of yes</th>
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<td>Aikawa, 2012</td>
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<td>N</td>
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<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>6</td>
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<td>AlEnzi, 2020</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Ben Abdelghani, 2012</td>
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<td>Y</td>
<td>N</td>
<td>N</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>7</td>
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<td>Caio, 2018</td>
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<td>Y</td>
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<td>Linzmeyer, 2020</td>
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<td>Y</td>
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<td>Y</td>
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<td>9</td>
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</table>

Y= Yes; N= No

PRISMA 2020 Flow Diagram

Identification of studies via databases and registers

Identification

Records identified from*:
Databases (n = 2635 + 281)
Registers (n = 0)

Records removed before screening:
Duplicate records removed (n = 863)
Records marked as ineligible by automation tools (n = 0)
Records removed for other reasons (n = 0)

Records screened (n = 1827 + 226)

Records excluded** (n = 1985)

Screening

Reports sought for retrieval (n = 68)

Reports not retrieved (n = 0)

Reports assessed for eligibility (n = 68)

Reports excluded:
Insufficient definition of outcome or exposure (n = 48)
Overlapping populations (n = 3)
Not in English language (n = 3)

Included

Studies included in any analysis (n = 14)
Studies included in primary meta-analysis (n = 11)


*The first search was conducted 13 June 2022. An updated search was conducted 9 July 2023. Identification of records is shown separately for each search (number of records for search 1 + number of records for search 2).
1. Medline

**Interface:** Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily

**Date of Search:** 2022-06-13, updated search 2023-07-09

**Number of hits:** 461 + 36

**Comment:**

- **exp/ = exploded MeSH term**
- **/ = non exploded MeSH term**
- **ti,ab,jw,kf. = title, abstract, journal word and author keywords**
- **adjx = within x words, regardless of order**
- *** = truncation of word for alternate endings**

```
1. exp Lupus Erythematosus, Systemic/
2. exp Lupus Nephritis/
3. (SLE OR Systemic Lupus Erythematosus OR Lupus).ab,kf,jw,ti.
4. 1 OR 2 OR 3
5. Celiac Disease/
6. exp Glutens/
7. exp Transglutaminases/
8. (celiac* OR celiak* OR coeliac* OR coeliak* OR 'non-tropical sprue' OR 'nontropical sprue').ab,ti,kw
9. (Gluten* OR gliadin* OR wheat).ab,kf,ti.
10. (endomys* OR antiendomys* OR ema OR aea OR transglutamin* OR anti-transglutamin* OR trans glutamin* OR ttg OR tta OR antigliadin OR aga).ti,ab,kf.
11. ((villus or villous) adj3 atroph*).ti,ab,kf.
12. 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11
13. 4 AND 12
14. limit 13 to yr="1990 - 2022"
14. *updated search) limit 13 to dt=20220614-20230613
```
2. Embase

Interface: embase.com

Date of Search: 2022-06-13, updated search 2023-07-09
Number of hits: 1463 + 212
Comment: Emtree is the controlled vocabulary in Embase

Field labels
- /exp = exploded Emtree term
- /de = non exploded Emtree term
- ti,ab,kw = title, abstract and author keywords
- NEAR/x = within x words, regardless of order
- * = truncation of word for alternate endings

1. 'systemic lupus erythematosus'/exp OR 'systemic lupus erythematosus'
2. 'lupus erythematosus nephritis'/exp OR 'lupus erythematosus nephritis'
3. slc:ti,ab,kw OR lupus:ti,ab,kw
4. #1 OR #2 OR #3
5. 'celiac disease'/de
6. 'gluten'/de
7. 'gliadin'/de
8. 'protein glutamine gamma glutamyltransferase'/de
9. 'protein glutamine gamma glutamyltransferase 2'/de
10. 'endomysium antibody'
11. 'endomysium'
12. celiac*:ti,ab,kw OR celiak*:ti,ab,kw OR coeliac*:ti,ab,kw OR coeliak*:ti,ab,kw OR 'non-tropical sprue':ti,ab,kw OR 'non-tropical sprue':ti,ab,kw
13. gluten*:ti,ab,kw OR gliadin*:ti,ab,kw
14. endomys*:ti,ab,kw OR antiendomys*:ti,ab,kw OR ema:ti,ab,kw OR aea:ti,ab,kw OR transglutamin*:ti,ab,kw OR 'anti transglutamin*':ti,ab,kw OR 'trans glutamin*':ti,ab,kw OR ttg:ti,ab,kw OR tga:ti,ab,kw OR 'antigliadin*':ti,ab,kw OR aga:ti,ab,kw
15. ((villus OR villous) NEAR/3 atroph*):ti,ab,kw
16. #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15
17. #4 AND #16 AND [01-01-1990]/sd
3. Cochrane Library

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<th>Field labels</th>
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<td>• ti,ab,kw = title, abstract and author keywords</td>
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<tr>
<td>Number of hits: 14 + 1</td>
<td>• NEAR/x = within x words, regardless of order</td>
</tr>
<tr>
<td></td>
<td>• * = truncation of word for alternate endings</td>
</tr>
<tr>
<td></td>
<td>• [ ] = MeSH descriptor, explode all trees</td>
</tr>
</tbody>
</table>

1. [Lupus Erythematosus, Systemic]  
2. [Lupus Nephritis]  
3. (SLE OR Systemic Lupus Erythematosus OR Lupus):ti,ab,kw  
4. #1 OR #2 OR #3  
5. [Celiac Disease]  
6. [Glutens]  
7. [Transglutaminases]  
8. (celiac* OR celiak* OR coeliac* OR coeliak* OR 'non-tropical sprue' OR 'nontropical sprue'):ti,ab,kw  
9. (gluten* OR gliadin*):ti,ab,kw  
10. (endomys* OR antiendomys* OR ema OR aea OR transglutamin*: OR anti-transglutamin*: OR trans glutamin*: OR ttg OR tta OR antigliadin OR aga):ti,ab,kw  
11. ((villus or villous) NEAR/3 atroph*):ti,ab,kw  
12. #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11  
13. #4 AND #12  

with Cochrane Library publication date from Jan 1990 to June 2022, updated search until July 2023
4. Web of Science Core Collection

<table>
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<th>Interface: Clarivate Analytics</th>
<th>Field labels</th>
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<td>• TS/Topic = title, abstract, author keywords and Keywords Plus</td>
</tr>
<tr>
<td>Number of hits: 697 + 29</td>
<td>• NEAR/x = within x words, regardless of order</td>
</tr>
<tr>
<td></td>
<td>• * = truncation of word for alternate endings</td>
</tr>
<tr>
<td></td>
<td>Note: sometimes “quotation marks” are needed for single search terms to avoid automatic term mapping (lemmatization).</td>
</tr>
</tbody>
</table>

1. TOPIC: ("Systemic Lupus Eryth*")
2. TOPIC: ("Lupus Nephritis")
3. TOPIC: (SLE OR Lupus)
4. #1 OR #2 OR #3
5. TOPIC: ((celiac* OR celiac* OR coeliac* OR coeliak* OR “non-tropical sprue” OR “nontropical sprue”))
6. TOPIC: ((gluten* OR gliadin*))
7. TOPIC: ((endomys* OR antiendomys* OR ema OR aea OR transglutamin* OR anti-transglutamin* OR "trans glutamin*" OR ttg OR tta or antigliadin or aga))
8. TOPIC: (((villus OR villous) NEAR/3 atroph*))
9. #5 OR #6 OR #7 OR #8
10. #4 AND #9
Limited to publication date: 1990-01-01 – 2022-06-13, updated until 2023-07-09

Figure S1 PRISMA Flow Diagram and search strategies.
Figure S2 Prevalence of coeliac disease restricted to cases of Marsh stage III in patients with systemic lupus erythematosus.

CI, confidence interval; I², heterogeneity; p, p-value
**Figure S3** Prevalence of coeliac disease in patients with systemic lupus erythematosus stratified by region.

CI, confidence interval; I², heterogeneity; p, p-value
E)

**Figure S4 A-E** (A) Meta-regression of the association between publication year and prevalence of coeliac disease (CD) in patients with SLE. Y-axis shows percentage with CD. X-axis displays publication year for each study. (B) Meta-regression of the association between study population size and prevalence of CD in patients with SLE. Y-axis shows percentage with CD. X-axis displays the study population size for each study. (C) Meta-regression of the association between the proportion of females and the prevalence of CD in patients with SLE. Y-axis shows percentage with CD. X-axis displays the proportion of females in each study. (D) Meta-regression of the association between the prevalence of CD in the general population and the prevalence of CD in patients with SLE. Y-axis shows percentage with CD. X-axis displays the prevalence of CD in the general population where the study took place. (E) Meta-regression of the association between the Joanna Briggs critical appraisal score and the prevalence of CD in patients with SLE. Y-axis shows percentage with CD. X-axis displays the Joanna Briggs assessment scores for each study.
Figure S5 Prevalence of coeliac disease antibodies (antitissue transglutaminase, antiendomysial, and antigliadin antibodies) in patients with systemic lupus erythematosus.

CI, confidence interval; I², heterogeneity; p, p-value