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Supplementary Material

1. Search algorithms on different Databases

Pubmed:

Relevant text of dry eye syndrome:

1. "dry eye syndromes"[MeSH Terms]

2. "dry eye syndromes"[All Fields])

3. "keratoconjunctivitis sicca"[MeSH Terms]

4. "keratoconjunctivitis sicca"[All Fields]

5. "xerophthalmia"[MeSH Terms]

6. "xerophthalmia"[All Fields] OR "xerophthalmias"[All Fields]

7. "dry eye"[All Fields]

8. "dry"[All Fields] OR "dryness"[All Fields] OR "xerosis"[All Fields]

9. "eye*"[All Fields] OR "cornea"[All Fields] OR "conjunctiva"[All Fields]

10. 8 AND 9

11. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 10

Relevant text of SLE and LN:

12. "lupus erythematosus, systemic"[MeSH Terms]

13. "systemic lupus erythematosus"[All Fields] OR "lupus erythematosus systemic"[All Fields] OR "SLE"[All Fields]

14. "lupus"[All Fields]

15. "system"[All Fields] OR "systemic"[All Fields]

16. 14 AND 15

17. "lupus nephritis"[MeSH Terms]

18. "lupus nephritis"[All Fields] OR "LN"[All Fields]

19. "glomerulonephritis "[All Fields] OR " glomerulonephritides "[All Fields] OR " nephritides "[All Fields] OR " kidney "[All Fields]

20. 14 AND 19

21. 12 OR 13 OR 16 OR 17 OR 18 OR 20

Relevant text of study type:

22. "case-control studies"[MeSH Terms]

23. "case control"[All Fields] OR "case control studies"[All Fields] OR "case comparison study"[All Fields]

24. "cohort studies"[MeSH Terms]

25. "cohort"[All Fields] OR "cohorts"[All Fields]

26. "observational studies as topic"[MeSH Terms]

27. "observational study"[All Fields] OR "observational studies"[All Fields]

28. "follow-up studies"[MeSH Terms]

29. "follow up"[All Fields] OR "follow up studies"[All Fields] OR "follow up study"[All Fields]

30. "cross-sectional studies"[MeSH Terms]

31. "cross sectional"[All Fields]

32. "longitudinal studies"[MeSH Terms] OR "longitudinal"[All Fields]

33. "epidemiologic studies"[MeSH Terms] OR "epidemiologic"[All Fields] OR "epidemiologic studies"[All Fields]) OR "epidemiologic study"[All Fields]

34. 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33

Combined (final strategy):

35. 11 AND 21 AND 34

Summary: (((((((((((("dry eye syndromes"[MeSH Terms]) OR ("dry eye syndromes"[All Fields]))) OR ("keratoconjunctivitis sicca"[MeSH Terms])) OR ("keratoconjunctivitis sicca"[All Fields])) OR ("xerophthalmia"[MeSH Terms])) OR ("xerophthalmia"[All Fields] OR "xerophthalmias"[All Fields])) OR ("dry eye"[All Fields]))) OR ((("dry"[All Fields] OR "dryness"[All Fields] OR "xerosis"[All Fields]) AND ("eye*"[All Fields] OR "cornea"[All Fields] OR "conjunctiva"[All Fields])))))) AND ((((((("lupus erythematosus, systemic"[MeSH Terms]) OR ("systemic lupus erythematosus"[All Fields] OR "lupus erythematosus systemic"[All Fields] OR "SLE"[All Fields])) OR ((("lupus"[All Fields]) AND ("system"[All Fields] OR "systemic"[All Fields])))) OR ("lupus nephritis"[MeSH Terms])) OR ("lupus nephritis"[All Fields] OR "LN"[All Fields])) OR ((("lupus"[All Fields]) AND ("glomerulonephritis "[All Fields] OR " glomerulonephritides "[All Fields] OR " nephritides "[All Fields] OR " kidney "[All Fields])))))) AND ((((((((((("case-control studies"[MeSH Terms]) OR ("case control"[All Fields] OR "case control studies"[All Fields] OR "case comparison study"[All Fields])) OR ("cohort studies"[MeSH Terms])) OR ("cohort"[All

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Fields] OR "cohorts"[All Fields])) OR ("observational studies as topic"[MeSH Terms])) OR ("observational study"[All Fields] OR "observational studies"[All Fields])) OR ("follow-up studies"[MeSH Terms])) OR ("follow up"[All Fields] OR "follow up studies"[All Fields] OR "follow up study"[All Fields])) OR ("cross-sectional studies"[MeSH Terms])) OR ("cross sectional"[All Fields])) OR ("longitudinal studies"[MeSH Terms] OR "longitudinal"[All Fields])) OR ("epidemiologic studies"[MeSH Terms] OR "epidemiologic"[All Fields] OR "epidemiologic studies"[All Fields]) OR "epidemiologic study"[All Fields])))) AND (1000/1/1:2020/4/30[pdat])

EMBASE:

Relevant text of dry eye syndrome:

1. 'dry eye syndrome'/exp

2. 'keratoconjunctivitis sicca'/exp

3. 'xerophthalmia'/exp

4. 'dry eye syndrome'

5. 'keratoconjunctivitis sicca'

6. 'xerophthalmia'

7. dry OR 'dryness'/exp OR dryness OR 'xerosis'/exp OR xerosis

8. 'eye'/exp OR eye OR 'cornea'/exp OR cornea OR conjunctivae

9. 7 AND 8

10. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 9

Relevant text of SLE and LN:

11. 'Systemic lupus erythematosus' /exp

12. 'Systemic lupus erythematosus' OR 'sle'

13. 'lupus'/exp OR lupus

14. 'system' OR 'systemic'

15. 14 AND 15

16. 'lupus erythematosus nephritis'/exp

17. 'lupus erythematosus nephritis' OR 'lupus nephritis'

18. 'glomerulonephritis'/exp OR glomerulonephritis

19. 'kidney'/exp OR kidney

20. 'nephritis'/exp OR nephritis

21. 'nephropathy'/exp OR nephropathy

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22. 18 OR 19 OR 20 OR 21

23. 13 AND 22

24. 'LN'

25. 11 OR 12 OR 15 OR 16 OR 17 OR 23 OR 24

Relevant text of study type:

26. 'case control study'/exp

27. case AND ('control'/exp OR control)

28. case AND ('comparison'/exp OR comparison)

29. 'cohort analysis'/exp

30. Cohort

31. 'cross-sectional study'/exp

32. Cross AND sectional

33. 'longitudinal study'/exp

34. 'longitudinal'/exp OR longitudinal

35. 'observational study'/exp

36. 'observational study'

37. 'follow up'/exp

38. 'follow up studies' OR 'follow up study'

39. 'epidemiology'/exp

40. 'epidemiology' OR 'epidemiologic'

41. 26 OR 27 OR28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR 40

Combined (final strategy):

42. 10 AND 25 AND 41

Summary: (('keratoconjunctivitis sicca'/exp OR 'keratoconjunctivitis sicca' OR ((dry OR 'dryness'/exp OR dryness OR 'xerosis'/exp OR xerosis) AND ('cornea'/exp OR cornea OR conjunctivae OR 'eye'/exp OR eye OR 'eyes'/exp OR eyes)) OR 'xerophthalmia'/exp OR xerophthalmia) AND ('systemic lupus erythematosus'/exp OR (systemic AND ('lupus'/exp OR lupus)) OR (system AND ('lupus'/exp OR lupus)) OR 'sle'/exp OR sle OR 'lupus erythematosus nephritis'/exp OR 'lupus nephritis'/exp OR 'lupus nephritis' OR (('glomerulonephritis'/exp OR glomerulonephritis) AND lupoid) OR

(('glomerulonephritis'/exp OR glomerulonephritis) AND ('lupus'/exp OR lupus)) OR (('kidney'/exp OR kidney) AND ('lupus'/exp OR lupus)) OR (('nephritis'/exp OR nephritis) AND ('lupus'/exp OR lupus)) OR (('nephropathy'/exp OR nephropathy) AND ('lupus'/exp OR lupus)) OR ln) AND ('case control study'/exp OR (case AND ('control'/exp OR control)) OR 'cohort analysis'/exp OR cohort OR (case AND ('comparison'/exp OR comparison)) OR 'cross-sectional study'/exp OR (cross AND sectional) OR 'longitudinal study'/exp OR 'longitudinal'/exp OR longitudinal OR 'follow up'/exp OR (('follow up'/exp OR 'follow up') AND ('study'/exp OR study OR 'studies'/exp OR studies)) OR 'observational study'/exp OR (('study'/exp OR study OR 'studies'/exp OR studies) AND ('observation'/exp OR observation OR observational)) OR 'epidemiology'/exp OR epidemiology OR epidemiologic)) AND [01-01-1000]/sd NOT [01-05-2020]/sd

Cochrane library:

1. MeSH descriptor: [Dry Eye Syndromes] explode all trees

2. MeSH descriptor: [Keratoconjunctivitis Sicca] explode all trees

3. MeSH descriptor: [Xerophthalmia] explode all trees

4. (Xerophthalmia) (Word variations have been searched)

5. (dry OR dryness OR xerosis) (Word variations have been searched)

6. (eye OR eyes OR cornea OR conjunctivae) (Word variations have been searched)

7. 5 AND 6

8. ("Conjunctivitis sicca") (Word variations have been searched)

9. 1 OR 2 OR 3 OR 4 OR 7 OR 8

10. MeSH descriptor: [Lupus Erythematosus, Systemic] explode all trees

11. MeSH descriptor: [Lupus Nephritis] explode all trees

12. (Glomerulonephritis OR Glomerulonephritides OR Nephritis OR Nephritides) (Word variations have been searched)

13. (lupus) (Word variations have been searched)

14. (kidney) (Word variations have been searched)

15. 12 OR 14

16. 15 AND 13

17. (LN) (Word variations have been searched)

18. (SLE) (Word variations have been searched)

19. (system) (Word variations have been searched)

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20. (systemic) (Word variations have been searched)

21. 13 AND 19

22. 13 AND 20

23. 21 OR 22

24. 10 OR 11 OR 12 OR 16 OR 17 OR 18 OR 23

25. 9 AND 24

26. MeSH descriptor: [Case-Control Studies] explode all trees

27. (case control) (Word variations have been searched)

28. (Case comparison) (Word variations have been searched)

29. MeSH descriptor: [Cohort Studies] explode all trees

30. (cohort) (Word variations have been searched)

31. MeSH descriptor: [Cross-Sectional Studies] explode all trees

32. (cross sectional) (Word variations have been searched)

33. MeSH descriptor: [Longitudinal Studies] explode all trees

34. (Longitudinal) (Word variations have been searched)

35. MeSH descriptor: [Observational Study] explode all trees

36. (Observational study) (Word variations have been searched)

37. MeSH descriptor: [Follow-Up Studies] explode all trees

38. (follow-up study) (Word variations have been searched)

39. MeSH descriptor: [Epidemiologic Studies] explode all trees

40. (Epidemiologic study) (Word variations have been searched)

41. 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR 40

42. 25 AND 41

Supplementary Table 1 characteristics of dry eye involvement of included studies

Author, year	country	Total SLE patients (N)	Patients with dry eye symptoms (N)	Patients with abnormal dry eye examination results (N and prevalence)				Patients with DED (N)	OR (95% CI)
				S1T≤5mm/5min	Rose Bengal Score≥3	Corneal Fluorescein Staining Score≥1	BUT≤10s		
Grennan, 1977[4]	New Zealand	22	NA	5	3	NA	NA	3	NA
Moutsopoulos, 1980[5]	America	24	5	5	NA	NA	NA	4	NA
Yap, 1998[6]	Singapore	70	1	45	17	NA	NA	17	NA
Frith, 1990[7]	England	18	4	1	NA	NA	NA	0	NA
Jensen, 1999[8]	Norway	20	12	8	NA	NA	NA	4	NA
Gilboe, 2001[9]	Norway	81	43	37	NA	NA	NA	21	NA
Ausayakhun, 2002[10]	Thailand	74	NA	NA	NA	NA	NA	11	NA
Wangkaew, 2006[11]	Thailand	50	18	11	NA	NA	NA	9	NA
Guobis, 2008[12]	Lithuania	82	7	NA	NA	NA	NA	NA	NA
Vera-Recabarren, 2010[13]	Spain	56	10	NA	NA	NA	NA	NA	NA
Xu, 2010[14]	China	255	36	NA	NA	NA	NA	NA	NA
Sitaula, 2011[15]	Nepal	91	36	6	NA	NA	NA	6	NA
Cartella, 2013[16]	Italy	535	182	NA	NA	NA	NA	NA	NA
Hernández-Molina, 2013[17]	Canada	103	41	22	NA	14	NA	14	NA
Pamuk, 2013[18]	Turkey	428	164	NA	NA	NA	NA	NA	NA
EI-Shereef, 2013[19]	Egypt	52	7	NA	NA	NA	NA	4	NA
Catoggio, 2014[20]	Multi-national	1480	150	NA	NA	NA	NA	32	NA
Fredi, 2014[21]	Italy	540	189	NA	NA	NA	NA	NA	NA
Choi, 2015[22]	Korea	201	24	NA	NA	NA	NA	NA	NA
Dahlia, 2017[23]	Egypt	100	24	NA	NA	NA	NA	NA	NA
Gawdat,2017[24]	Egypt	40	NA	6	NA	NA	16	6	NA
Khan, 2017[25]	Pakistan	663	227	NA	NA	NA	NA	NA	NA
Dammacco, 2018[26]	Italy	98	7	11	6	NA	NA	11	NA
Mosca, 2018[27]	Multi-national	389	15	NA	NA	NA	NA	NA	NA
Ong Tone,2019[28]	Canada	34	19	7	17	20	17	11	NA
Wang, 2019[29]	China	78	26	NA	NA	NA	37	19	NA
Hsu, 2020[30]	China	521	NA	NA	NA	NA	NA	144	4.45 (3.54-5.58)
Dias-Santos, 2020[31]	Portugal	161	NA	NA	NA	NA	NA	20	NA
Wang, 2012[43]	China	NA	NA	NA	NA	NA	NA	12007	3.98 (2.93-5.42)

BUT, tear break time; DED, dry eye disease; SIT, schirmer's test; SLE, systemic lupus erythematosus

Supplementary Table 2 Results of meta-regression analysis (for prevalence of DED in SLE)

Variable	Coefficient	95% CI	*P* value
Mean age			0.622
<20[24,28]	0.456	-1.268, 2.181	0.577
20-40[5,6,11,15,17,19,20,26,29]	-0.260	-1.653, 1.133	0.693
>40[7-9,30,31]	0.168	-1.306, 1.643	0.809
Disease durations			0.708
<5[15,17,26]	-0.188	-1.980, 1.603	0.825
5-10[5,8,9,11,19,20,29]	0.037	-1.613, 1.687	0.963
Unknown[4,6,7,10,24,28,30]	0.385	-1.271, 2.041	0.626
Disease activity			0.716
low disease activity[8,9,11,17,20,24,29]	0.352	-0.984, 1.687	0.583
Unknown[4-7,10,15,28,30,31]	0.501	-0.817, 1.818	0.431
Sample size[4-11,15,17,19,20,24,26,28-31]	-0.001	-0.002, -0.0004	0.004
Publication year[4-11,15,17,19,20,24,26,28-31]	0.001	-0.031, 0.032	0.971
Study location			0.022
New Zealand[4]	0.092	-1.713, 1.898	0.901
America[5]	0.298	-1.264, 1.859	0.645
Singapore[6]	0.673	-0.372, 1.718	0.159
England[7]	-1.562	-4.078, 0.953	0.171
Norway[8,9]	0.682	-0.278, 1.642	0.127
Thailand[10,11]	0.272	-0.707, 1.251	0.507
Nepal[15]	-0.631	-2.035, 0.774	0.301

Canada[17,28]	0.524	-0.412, 1.461	0.210
Egypt[19,24]	-0.066	-1.222, 1.090	0.889
Multi-national[20]	-1.729	-2.724, -0.735	0.007
Italy[26]	-1.102	-1.263, 1.605	0.831
China[29,30]	0.757	-0.091, 1.605	0.070
Classification criteria of SLE			0.721
1971ACR[4,5]	-0.474	-2.562, 1.614	0.632
1982ACR[6-9,15,20]	-0.906	-2.638, 0.826	0.279
1997ACR[17,19,24,28,30,31]	-0.370	-2.087, 1.348	0.649
Mixed[10,11,26]	-0.527	-2.371, 1.317	0.548

ACR, American College of Rheumatology; DED, dry eye disease; SLE, systemic lupus erythematosus

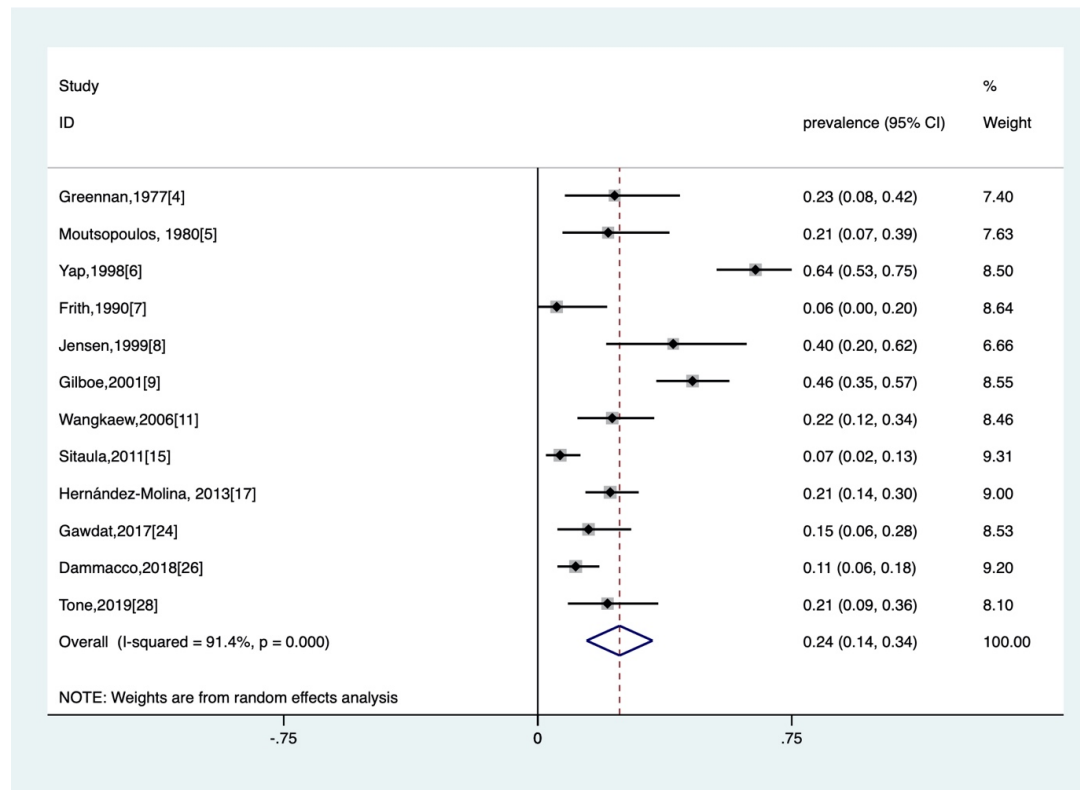**Supplementary Table 3** Results of sensitivity analysis (for prevalence of DED in SLE)

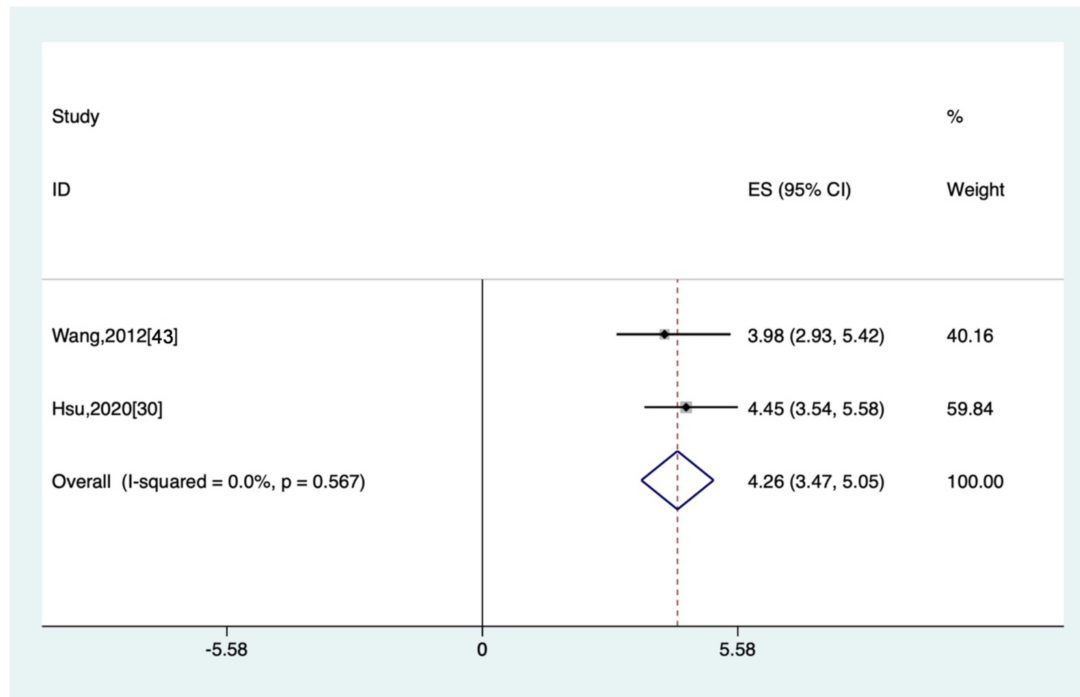| Study	Prevalence of DED in SLE	95%Cl	*P* value[a]	I^2
All[4-11,15,17,19,20,24,26,28-31]	0.16	0.10,0.21	<0.001	94.0%
Grennan 1977 excluded[4]	0.16	0.10,0.21	<0.001	94.4%
Moutsopoulos 1980 excluded[5]	0.15	0.10,0.21	<0.001	94.3%
Yap 1998 excluded[6]	0.15	0.09,0.21	<0.001	94.1%
Frith 1990 excluded[7]	0.16	0.11,0.22	<0.001	94.3%
Jensen 1999 excluded[8]	0.14	0.09,0.19	<0.001	94.0%
Gilboe 2001 excluded[9]	0.15	0.09,0.20	<0.001	94.0%
Ausayakhun 2002 excluded[10]	0.16	0.10,0.21	<0.001	94.3%
Wangkaew 2006 excluded[11]	0.15	0.10,0.21	<0.001	94.3%
Sitaula 2011 excluded[15]	0.16	0.10,0.22	<0.001	94.4%
Hernández -Molina 2013 excluded[17]	0.16	0.10,0.21	<0.001	94.2%
EI-Shereef 2013 excluded[19]	0.16	0.10,0.22	<0.001	94.4%
Catoggio 2014 excluded[20]	0.16	0.12,0.21	<0.001	81.6%
Gawdat 2017 excluded[24]	0.16	0.10,0.21	<0.001	94.3%
Dammacco 2018 excluded[26]	0.16	0.10,0.22	<0.001	94.3%
Ong Tone 2019 excluded[28]	0.15	0.09,0.20	<0.001	94.1%
Wang 2019 excluded[29]	0.15	0.09,0.21	<0.001	94.0%
Hsu 2020 excluded[30]	0.14	0.10,0.19	<0.001	88.6%
Dias-Santos 2020 excluded[31]	0.16	0.10,0.22	<0.001	94.2%

DED, dry eye disease; SLE, systemic lupus erythematosus

[a] *P* values from the test for overall effect.

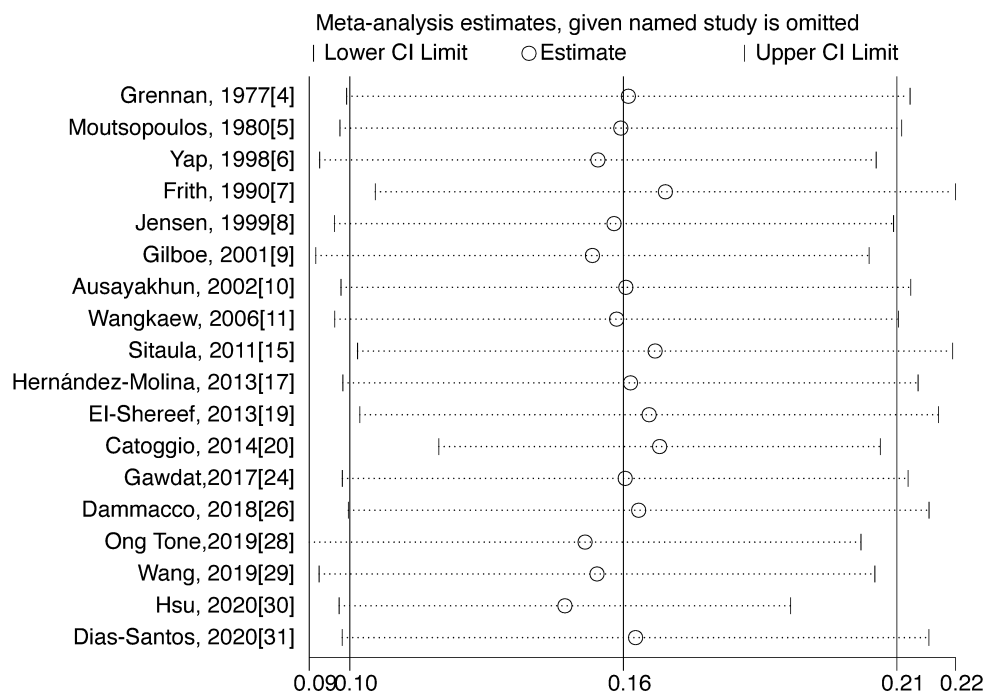**Supplementary Figure 1** The prevalence of dry symptoms in SLE patients.
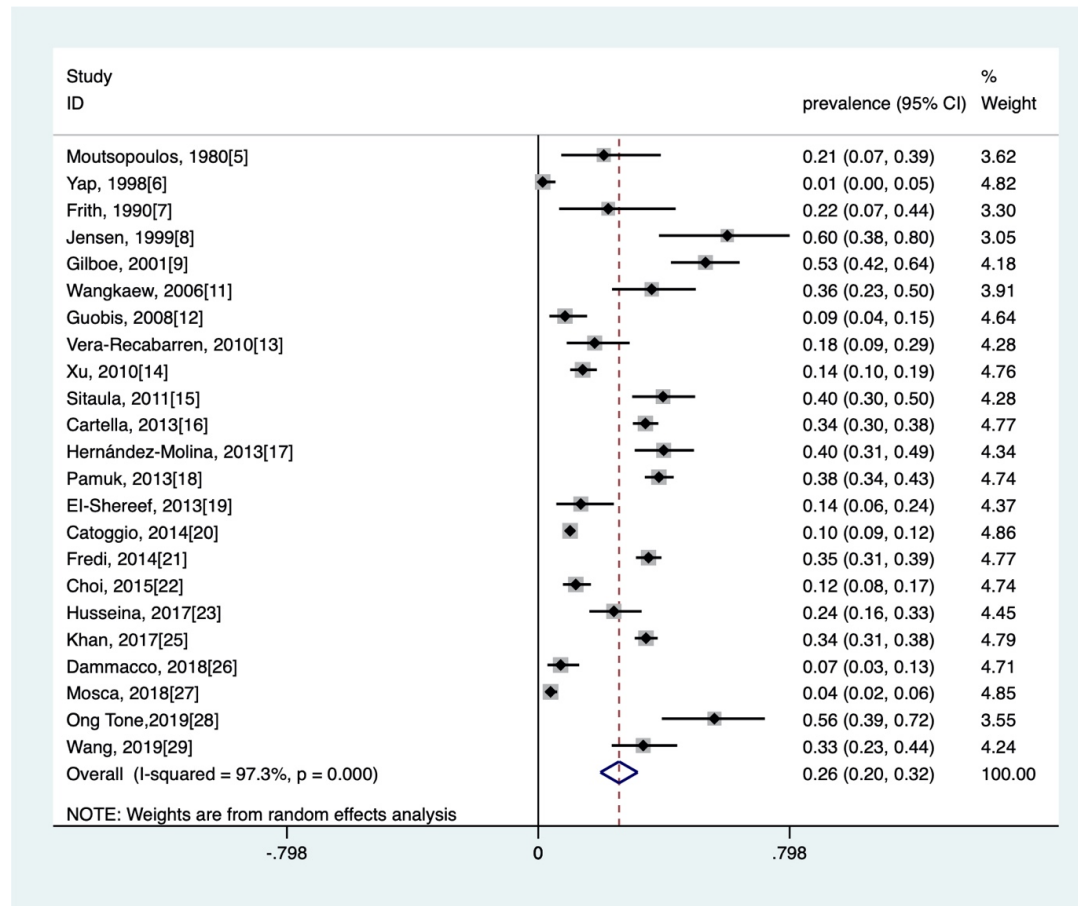
Supplementary Figure 2 The prevalence of abnormal Schirmer's test in SLE patients.

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Supplementary Figure 3 The odds ratio (OR) of DED in patients of SLE.

Supplementary figure 4 The bubble plot of the prevalence of DED among SLE patients regressed against the publication year of included studies.
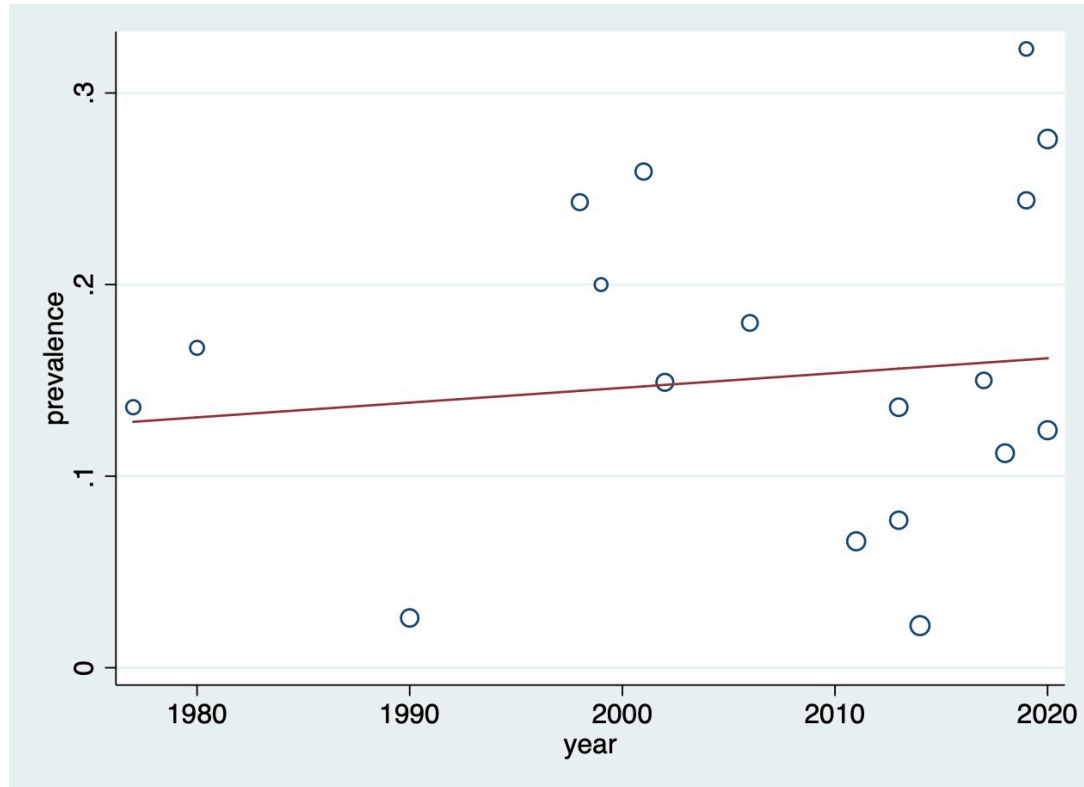
Supplementary Figure 5 Results of sensitivity analysis.

Supplementary Figure 6 The prevalence of DED in SLE patients after excluding two studies.