

Oral and Topical Vitamin D Supplementation and the Incidence of Non-Melanoma Skin Cancer: Systematic Review of Randomized Controlled Studies

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Learning Objective:

To evaluate the evidence on vitamin D supplementation and its impact on NMSC prevention and safety.

Content Outline

- 01 Introduction
- 02 Methods
- 03 Results
- 04 Discussion
- 05 Conclusion



Introduction

- NMSC (BCC and SCC) is the most common skin cancer, rising 3–7% annually
- UV radiation is the main risk factor; cumulative exposure drives BCC/SCC
- UV also produces vitamin D, which regulates cell growth and immunity
- Evidence on vitamin D and NMSC risk is conflicting (protective, null, or harmful)
- NMSC causes major morbidity and healthcare burden → need clear evidence to guide prevention and vitamin D use



Methods

Study Design & Database

- Systematic review following PRISMA guidelines
- PubMed & Cochrane Library (search until June 2025)

Inclusion

P: Adults with or at risk of NMSC (BCC, SCC)
I: Oral/topical vitamin D
C: Placebo, no treatment, or other regimens
O: Incidence or recurrence of BCC/SCC
D: RCTs, cohort, case-control studies

Exclusion

- Melanoma only
- Animal lab studies
- Reviews
- Case reports

Outcomes

- Primary: Incidence or recurrence of NMSC
- Secondary: Side effects, other skin cancers

Screening & Extraction

- Done by 4 Independent reviewers
- Risk of bias assessed using Cochrane RoB 2 and Newcastle-Ottawa scale

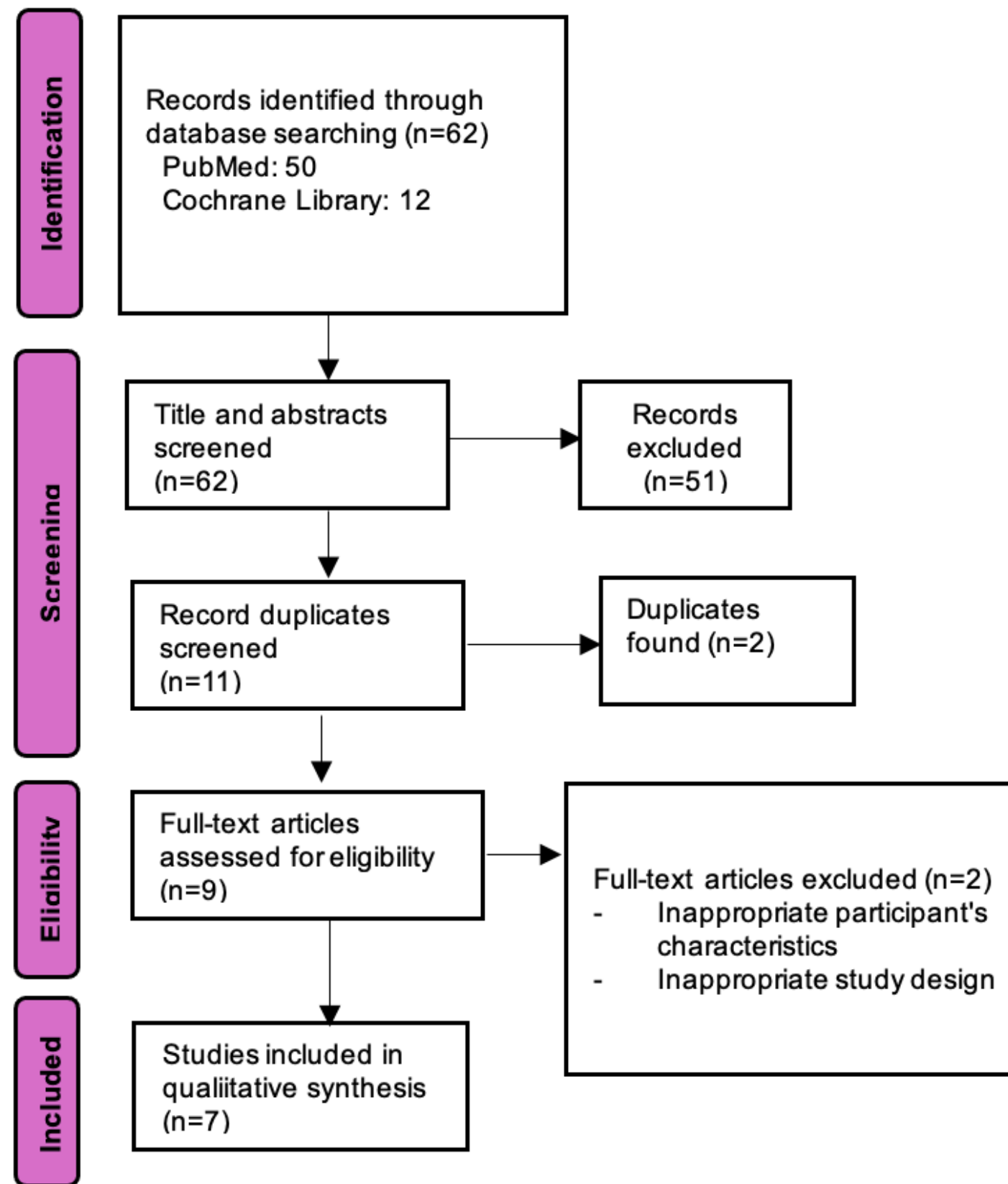
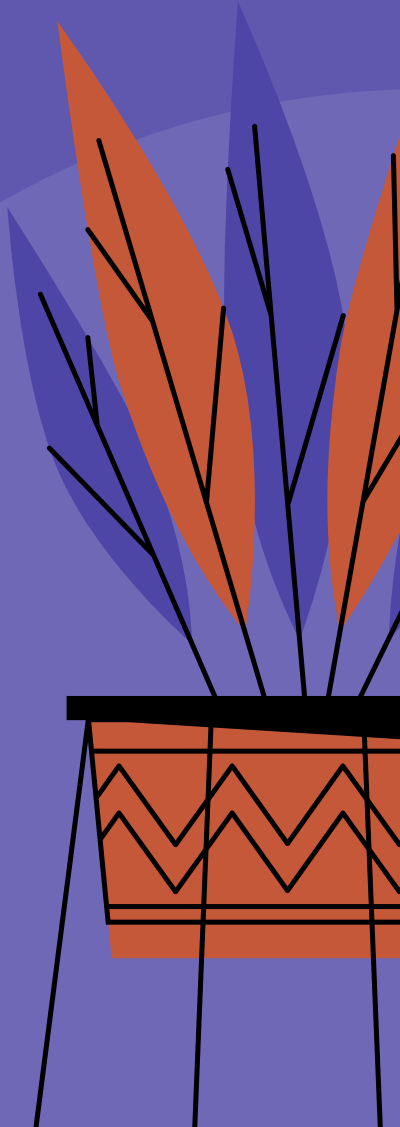


Diagram flow of literature search strategy for this systematic review



Characteristics and result of the included studies



Study (year)	Design	Population	Key Findings/ Conclusion
Passarelli (2020)	RCT	Adult 45-75 yo, recent colorectal adenoma	Vitamin D had no effect on BCC/SCC; Calcium (alone/with Vit D) may reduce SCC risk
Ince (2019)	Prospective Cohort	BCC patients with Vitamin D deficiency	Maintaining serum 25-OH Vitamin D3 >25 ng/mL significantly reduced BCC recurrence
Rosenberg (2019)	RCT+ Prospective Cohort	Adults with >= 4 AKs on face/scalp/ extremities	Topical calcipotriol +5FU reduced SCC risk on treated sites; no effect on BCC
Brinkhuizen (2016)	Phase II RCT	Adults with superficial/ nodular BCC	Topical calcitriol did not significantly induce regression in sBCC; diclofenac effective
Asgari (2011)	Case control	KPNC members, 43-85yo, pathology verified SCC	No significant association between Vitamin supplement use and SCC risk
Tang (2011)	RCT, Post Hoc	Postmenopausal women 50-79y, no cancer past 10y except NMSC	No effect on NMSC or melanoma incidence overall; reduced melanoma risk in women with prior NMSC
Park (2016)	Prospective Cohort	US White health professionals, no prior cancer	Vitamin D intake positively associated with BCC risk; null for SCC; no protective effect for NMSC

Results



- 7 studies (3 RCTs, 3 cohorts, 1 case-control), >180,000 participants
- WHI & other RCTs: no reduction in NMSC with vitamin D \pm calcium

- Cohort data: higher vitamin D intake \rightarrow modest \uparrow BCC risk, no effect on SCC
- **Small Turkish study: high dose vitamin D \downarrow BCC recurrence in deficient patients**

- Topical vitamin D: effective only with 5-FU for SCC, not for BCC
- Overall: **no clear benefit**; possible role in deficiency — **more RCTs needed**

Discussion

- **No strong evidence** of oral vitamin D for BCC or SCC prevention
- Large trials: no effect; some show slight + BCC risk (likely from sun exposure)
- In deficient patients, possible + BCC recurrence (inconclusive)
- Topical vitamin D works only with other treatments (e.g., 5-FU)
- **Not recommended** for general prevention
- Key: **Sun protection + early detection**





- Oral vitamin D doesn't prevent NMSC in the general population
- No clear benefit for Bec or skin cancer risk reduction
- Possible recurrence benefit in deficient individuals, but inconclusive
- Topical vitamin D only helps in specific combinations
- Focus on sun protection and early detection for prevention
- Use vitamin D for bone health, not skin cancer prevention

Conclusion

Questions or comments?

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