Table 1: Systematic reviews of curcumin as anticancer treatment

Source: CAM-Cancer Collaboration. Curcumin as anticancer treatment [online document]. Curcumin | Anticancer treatment, October 2026.

Review characteristics	PICO of included studies	Results and conclusions	Assessment
Gutsche, L. C., Drefer, J., & Hüber, J. (2025). *Curcumin as a complementary treatment in oncological therapy: A systematic review*. European Journal of Clinical Pharmacology, 81, 1-33. https://doi.org/10.1007/s00228-024-03764-9			
Type of review Systematic review with narrative synthesis. **Studies: n and design** 34 RCTs **Search strategy** *Databases* MEDLINE (Ovid), Embase (Ovid), Cochrane CENTRAL, PsycINFO (EBSCO), CINAHL (EBSCO) *Dates* From 1995 to January 2024 *Risk of bias assessment* Cochrane Risk of Bias tool RoB 2.0	**Participants** 2,580 participants (2,449 analyzed). Adults diagnosed with any type and stage receiving cancer treatment **Interventions** Oral curcumin supplementation (20 + RCTS), Curcumin mouthwash /rinse (8 RCTs), topical curcumin oral gel (3 RCTs), topical curcumin gel (3 RCTs), Intravenous curcumin (1 RCT) **Control** UC, Chlorhexidine, benzydamine, povidone-iodine, HPR Plus™ cream, aloe vera, Riboflavin placebo + paclitaxel **Outcome measures:** *Survival (4 RCTs):* Overall Survival (OS), Progression-Free Survival (PFS), Time to Tumor Progression (TTP) *Oral mucositis (13 RCTs):* WHO Oral Mucositis Scale, WHO Oral Toxicity Scale, OMAS, NCI-CTCAE, NCI-CTC v2, RTOG criteria. *Pain (11 RCTs):* Numerical Rating Scale (NRS), Visual Analogue Scale (VAS), McGill Pain Questionnaire-Short Form (MPQ-SF). *Radiation dermatitis (4 RCTs)*: Radiation Dermatitis Severity Scale (RDS), RTOG Skin Toxicity Criteria, NIH CTCAE	**Results for risk of bias assessment of primary studies included in the review** Overall, the risk of bias was rated as high for 22 studies; twelve studies were rated as moderate risk of bias, and no studies were rated as low or unclear risk of bias. Most studies had issues with blinding, randomization, and unreliable concealment methods. **GRADE:** No GRADE assessment was conducted. **Results for outcome measures** *Overall survival (OS):* Prolonged OS reported in one out of four RCTs. Improved OS in colorectal cancer with ITT analysis HR = 0.339 (0.141, 0.815) p = 0.016; with per-protocol analysis HR = 0.271 (0.106, 0.697) p = 0.004. (Howells 2019). The remaining 3 RCTs did not show significant associations. *Progression-free survival:* No significant results reported in the four included RCTs. *PSA progression*: One out of four RCTs reported lower PSA progression rate in prostate cancer of 10.3% vs 30.2%, p=0.0259 (Choi 2019). *Tumor response:* Two out of seven RCTs reported a higher response or remission rate. objective response rate higher with curcumin + paclitaxel. ORR 50.7% vs 33.3% p = 0.0145 (Saghatelyan 2020). Higher remission rate in multiple myeloma. OR 75% vs 33.3% p = 0.01 (Santosa 2022).	**Quality assessment of the SR** Moderate according to the AMSTAR 2 checklist. Methods only partially described as this SR was part of guideline development and the authors did not provide a protocol registration. **Comments** Although the SR is of moderate quality, there is substantial heterogeneity in design, populations and outcome measures and pool effect estimates could not be calculated. The included studies had small sample sizes, and moderate/high risk of bias in the included studies. The review did not assess certainty of evidence using GRADE

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	Quality of life (9 RCTs): EORTC QLQ-C30, EORTC QLQ-PR25, UW-QOL, FACT-P, Skindex-29. *Functional status (5 RCTs):* ECOG Performance Status, Karnofsky Performance Status *Prostate cancer progression(PSA) (3 RCTs):* PSA levels, PSA progression rates *Tumor response (7 RCTs):* RECIST criteria, WHO Response Criteria, Pathologic Complete Response (pCR) *Body composition (2 RCTs):* Bioelectrical Impedance Analysis (BIA), body fat mass, skeletal muscle mass, BMI *Adverse events (13 RCTs)*: CTCAE, NCI-CTCAE, laboratory toxicity measures **Measure of treatment effect** Mean differences, risk ratios, proportions, hazard ratios (HRs), between-group mean differences, incidence rates**,** mean score differences, odds ratios, response rates, risk estimates	The remaining 5 RCTs did not show significant associations *Radiation dermatitis (skin toxicity):* One out of four RCTs showed lower radiation dermatitis severity with curcumin SD -0.8 (-1.4, -0.2) p=0.008. *Pain associated with skin toxicity*: One out of four RCTs reported lower various pain scores with nanocurcumin during radiotherapy p=0.002 to 0.045. *Oral mucositis:* Twelve of the 13 RCTs showed significantly lower mucositis severity with curcumin versus placebo, chlorhexidine, benzydamine, or povidone-iodine. p<0.001 to p=0.003 across studies (Talakesh 2022). *Pain associated with oral mucositis:* Six out 7 RCTs showed significant reduction in oral pain with curcumin compared with placebo or active controls p<0.001 to p=0.02. *Weight loss*: Less weight loss reported in 3 RCTs with nanocurcumin or turmeric rinse. The remaining 2 RCTs did not show significant associations. *Body composition:* improved muscle mass compared with placebo in one RCT, the other RCT did not show significant associations. *Quality of Life (QoL):* Two out of nine RCTs reported greater QoL improvement with curcumin (Panahi 2014) and improvement in functional and global QoL scores (Panahi 2021a). The remaining 7 RCTs did not show significant associations. **Subgroup analysis** Overall, subgroup analyses suggested that the benefits of curcumin were most consistently observed among patients undergoing chemotherapy and/or radiotherapy for head and neck cancers, particularly for reducing oral mucositis, oral pain, and treatment-related weight loss. Some studies also suggested differential effects according to cancer type, treatment	

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		modality, baseline disease characteristics, or curcumin dose, but these findings were often based on small sample sizes and should be interpreted cautiously **Adverse events** The authors do not provide the number of RCTs assessing side effects of curcumin but only one study reported significantly more vomiting in the intervention group. Other adverse events reported in two other RCTs were minor (i.e., gastrointestinal symptoms such as nausea, diarrhea, abdominal discomfort, and vomiting). **Conclusion** "*Although studies showed some beneficial effects of curcumin administration on cancer therapy-related side effects, especially oral symptoms and weight loss, there were clear methodological weaknesses decreasing the reliability of these results*."	
Limbrunner, J., Doerfer, J., Pietschmann, K., Buente, J., Scharpenberg, M., & Huebner, J. (2025). *The influence of antioxidant supplementation on adverse effects and tumor interaction during radiotherapy: A systematic review*. Clinical and Experimental Medicine, 25, 258. https://doi.org/10.1007/s10238-025-01804-x			
Type of review Systematic review with narrative synthesis **Studies: n and design** 39 RCTs, thereof 17 RCTs of curcumin/turmeric preparations. ***Search strategy:*** ***Databases*** MEDLINE (Ovid), EMBASE (Ovid), CINAHL (EBSCO), Cochrane CENTRAL, and PsycINFO (EBSCO) ***Dates*** Search conducted in 2024 but no start date mentioned. **Risk of bias assessment** Cochrane Risk of Bias tool RoB 2	**Participants** 3,184 participants Adults (≥16 years) with any type of cancer at any stage receiving radiotherapy. **Interventions** Curcumin/Turmeric preparations 17 RCTs, Vitamin-based interventions 11 RCTs. Flavonoids 8 RCTs. Glutathione 3 RCTs. Multiple antioxidant combinations 2 RCTs. **Control** UC, placebo control, active control (Chlorhexidine mouthwash, benzydamine mouthwash, povidone-iodine, anesthetic/antimicrobial solution) **Outcome measures (primary outcomes)** Oral mucositis (14 RCTs): Curcumin/turmeric (n=12), Vitamin C/E (n=2). WHO Oral Mucositis Scale, CTCAE, Oral Mucositis Assessment Scale (OMAS), Oral	**Results for risk of bias assessment of primary studies included in the review** Overall, the risk of bias was rated as high for 23; ten studies were rated as some concerns, and six were rated as low risk of bias. Reasons for higher risk ratings included lack of blinding, absence of intention-to-treat analyses, incomplete outcome data, small sample sizes, and selective reporting of outcomes. **GRADE** No GRADE assessment was conducted. **Results for outcome measures** ***Tumour-Related outcomes*** (evaluated as secondary outcomes) Studies evaluating curcumin (3 RCTs) showed no significant effect on tumour-related outcomes. Head and neck cancer recurrence: Higher plasma β-carotene associated with lower recurrence risk. HR = 0.54, (0.32, 0.91), $p < 0.05$.	**Quality assessment of the SR** Moderate quality according to AMSTAR 2 checklist. No assessment of publication bias was reported. The results of the reviews relied on narrative synthesis. **Comments** Considerable clinical heterogeneity. The included studies varied widely in cancer types, stages, radiotherapy regimens, antioxidant agents, dosages, routes of administration, and outcomes measured. The included studies had small sample sizes.

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	Health Assessment Tool (OHAT), Numerical Rating Scale (NRS), PROMS. Dermatitis/Radiodermatitis (8 RCTs: Vitamins C/E (n=2), Curcumin (n=3), Flavonoids (n=2), Glutathione (n=1) RTOG criteria, CTCAE, Radiation Dermatitis Severity Score, Skin Toxicity Assessment Tool, thermography, cutometer, mexameter. Proctitis/Cystitis (1 RCT: curcumin): CTCAE (Common Terminology Criteria for Adverse Events **Measure of treatment effect** Odds Ratio, hazard Ratio Risk/percentage, mean differences, p-values, confidence interval.	Second primary cancer (smokers receiving antioxidants during RT): Increased risk observed. HR = 2.41 (1.25, 4.64), p = 0.03. Death from first cancer (smokers receiving antioxidants during RT): Increased mortality observed.HR = 3.38, 95% CI (1.11, 10.34), p = 0.04. Overall survival, disease-free survival, progression-free survival (several studies): No significant differences. ***Primary outcomes*** ***<u>Radiation-induced dermatitis</u>*** Curcumin (3 RCTs) reduced dermatitis severity in two RCTs. Mean difference = −0.8, 95% CI (−1.4, −0.2), p = 0.008 (Ryan et al.). The second study reported a p-value of the comparison for grade 3 and grade 3 dermatitis after 6-weeks (p= 0.037) EGCG (2 RCTs) lowered incidence of grade ≥2 dermatitis. Significant benefit reported; p = 0.008. ***<u>Proctitis/Cystitis:</u>*** Curcumin (1 RCT) showed no significant benefit in the one included RCT. ***<u>Oral mucositis</u>*** *Vitamin C* (2 RCTs) supplementation reduced mucositis severity in a dose-dependent manner. Significant benefit reported $p < 0.001$. *Vitamin E (2 RCTs)* mouth rinse reduced occurrence of oral mucositis. Significant benefit reported; p = 0.038. *Curcumin (12 RCTs)* improved oral mucositis in eleven of twelve RCTs. Significant benefit reported; p-values ranged from <0.001 to 0.027. **Secondary outcomes** ***<u>Quality of life (3 RCTs)</u>*** Urinary symptoms (curcumin, prostate cancer. 1 RCT): reduced symptoms. Significant benefit reported; p = 0.011. Cardiac toxicity (LVEF decline): Vitamins C + E + NAC reduced decline in LVEF. Significant benefit reported; p = 0.008 (RTX only), p = 0.03 (CRTX); effect size not reported. The remaining two RCTs showed no significant effect on QoL outcomes from curcumin.	

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		Weight Loss (4 RCTs) Weight loss during radiotherapy: Curcumin reduced weight loss in all four studies. Significant benefit reported; p-values from 0.003 to <0.001. **Adverse events** For the majority of the interventions, including curcumin, the studies assessed did not evaluate the adverse events. For those evaluated events were mild. ***Conclusions*** "In conclusion, we are not able to give a concrete recommendation for the use of antioxidants during radiotherapy. This is due to the very heterogeneous results of the studies, which predominantly had small numbers of included patients and generally a medium to high risk of bias."	
de Waure C, Bertola C, Baccarini G, Chiavarini M, Mancuso C. Exploring the Contribution of Curcumin to Cancer Therapy: A Systematic Review of Randomized Controlled Trials. Pharmaceutics. 2023;15(4):1275. doi:10.3390/pharmaceutics15041275.			
Type of review Systematic review Narrative synthesis due to expected heterogeneity in cancer types, curcumin formulations, dosages, and outcome assessment timing **Studies: n and design** 7 RCTs published 2016-2022. **Search strategy** **Databases** PubMed, Scopus, Cochrane CENTRAL. **Dates** Database inception to 29 January 2023 **Risk of bias assessment** Cochrane Risk of Bias Tool version 2	**Participants** Total of 602 participants (22-223 participants). Colorectal (n=2 RCTs), prostate (n=2); breast, multiple myeloma, oral leukoplakia (n=1, respectively). **Interventions** Curcumin in combination with chemo, radio, chemoradiotherapy (n=5), curcumin only (n=2). **Comparisons** Placebo + standard therapy (6 RCTs); placebo alone (oral leukoplakia trial). One RCT used intravenous curcumin, others oral administration. **Outcome measures** Overall and progression free survival (time to event), objective response rate (complete/partial response evaluation, pathologic complete response, histological	**Results for risk of bias assessment of primary studies included in the review** Most studies were low risk (n=4). Other were some concerns (n=2), high risk (n=1). **GRADE assessment** No GRADE assessment. **Results for outcome measures** **Overall survival (n=3):** Only one very small trial (n=27 thereof 18 participants in the curcumin group and 9 in the control group) reported statistically significant OS in the curcumin group in the per protocol analysis. Two other RCTs did not report any significant improvements. **Progression-free Survival (n=4)** PFS showed no significant difference in any study. **Objective/Clinical Response (n=4)** Better results were detected in the curcumin arm compared to the placebo in three out of four studies	**Quality assessment of SR** Low-moderate. No protocol published. **Comments** Several studies were underpowered and had small sample sizes. Some trials terminated early and several had substantial dropout rates. Evaluated clinically meaningful (objective) outcomes such as OS, PFS, objective response, pathological response, and remission. Potential selection bias cannot be completely excluded. Studies were highly heterogeneous regarding cancer type, stage, formulation and bioavailability, dose, route, and outcomes. Most studies involved advanced or metastatic cancers, potentially underestimating efficacy in earlier disease stages.

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	response, clinical response, remission, PSA progression, adverse events. **Measure of treatment effects** Hazard ratios (HRs) for survival outcomes, response/remission proportions (%), median survival/progression times, incidence of adverse events.	while worse results with curcumin were reported in one RCT. **Oral leukoplakia** Clinical response at 6 months: 67.5% vs 55.3%; histologic response: 22.3% vs 20.5%. Combined clinical + histologic response: 58.0% vs 44.6%. **Adverse events** Five RCTs assessed adverse events. Any AEs were reported to be similar between groups and were reported by 15% to 54%. Grade 3/4 AEs were reported to be around 4%. In one RCT the difference between groups reached the significance. **Authors conclusion** "*After a careful evaluation of the clinical evidence currently available, the conclusion that can be drawn is that curcumin is not an effective compound in either blocking or slowing down the progression of cancer*."	

Abbreviations
CI: confidence interval
CRTX: Chemoradiotherapy
CTC: Common Toxicity Criteria
CTCAE: Common Terminology Criteria for Adverse Events
HR: hazard ration
NCI-CTC: National Cancer Institute Common Terminology Criteria
NRS: Numeric Rating Scale
OS: overall survival
PFS: progression-free survival
PROMIS: Patient-Reported Outcomes Measurement Information System
PSA: prostate-specific antigen
RCT: randomized controlled trial
RDS Score: Radiation Dermatitis Severity Score
RoB: Cochrane Risk of Bias Tool version 1
RoB2: Cochrane Risk of Bias Tool version 2
RTOG: Radiation Therapy Oncology Group toxicity scale
RTX: Radiotherapy
SMD: standardized mean differences
UC: Usual care
VAS: Visual Analog Scale
WHO: World Health Organization
WLC: Waitlist control
WMD: Weighted mean difference.

***AMSTAR 2 Critical Domain Items**
1. Was the review protocol established a priori (e.g., registered in PROSPERO)?
2. Was the search comprehensive and included multiple databases, grey literature, and appropriate search strategies?
3. [Did the authors provide a list of excluded studies and justify the exclusions?]
4. Was the risk of bias (RoB) of included studies assessed using appropriate tools?
5. If a meta-analysis was conducted, were the methods used appropriate and clearly described?
6. Did the authors consider the RoB in individual studies when discussing the results?
7. Was publication bias assessed and discussed appropriately?

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