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PATTERN AND APPROPRIATENESS OF ANTIBIOTIC USE IN ACNE VULGARIS AND ANTIFUNGAL USE IN TINEA INFECTION AS PER STANDARD TREATMENT GUIDELINES: A SYSTEMATIC REVIEW

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ABSTRACT :

Background: Acne vulgaris and tinea (dermatophyte) infection are among the commonest reasons for a dermatology outpatient visit and are routinely managed with antimicrobials, yet prescribing audits repeatedly report deviations from standard treatment guidelines. Objectives: To identify, appraise and synthesise studies describing antibiotic-prescribing patterns in acne vulgaris and antifungal-prescribing patterns in tinea infection, and to assess conformity with standard treatment guidelines (AAD acne guideline, IADVL Dermatophytosis Manual, WHO Model List of Essential Medicines). Methods: Conducted per PRISMA 2020, a structured multi-source search of PubMed/MEDLINE-, Google Scholar-, DOAJ- and Scopus-indexed literature, institutional repositories and medRxiv was performed on 17 August 2026, supplemented by backward citation searching. A single reviewer performed screening, extraction and quality appraisal using an adapted JBI checklist. Results: Of 46 records identified and 36 screened after de-duplication, 9 studies were included (5 on acne antibiotic prescribing, 4 on tinea antifungal prescribing). Drug-class selection was broadly guideline-concordant, but only 2 of 9 studies formally benchmarked prescribing using WHO/INRUD indicators. Recurring concerns included prolonged antimicrobial duration and demographic inequity in acne, and low essential-medicines adherence and polypharmacy in tinea. Conclusion: Prescribing generally selects guideline-consistent drug classes, but formal indicator-based verification of appropriateness remains uncommon; standardised prescribing indicators and dermatology-specific antimicrobial stewardship are priorities for future practice and research.

Keywords: Acne Vulgaris; Tinea; Antibiotic Prescribing; Antifungal Agents; Standard Treatment Guidelines; Systematic Review.

1. Introduction

Acne vulgaris and dermatophyte (tinea) infections are among the most frequent reasons for a dermatology outpatient consultation worldwide, and both conditions are conventionally managed with antimicrobial agents – systemic and topical antibiotics for acne, and topical or oral antifungals for tinea. Acne vulgaris affects an estimated 80–85% of adolescents and young adults at some point, and current evidence-based guidance from the American Academy of Dermatology (AAD) gives a strong recommendation for benzoyl peroxide, topical retinoids, topical antibiotics and oral doxycycline, while explicitly cautioning that systemic antibiotic monotherapy should be avoided and that treatment duration should be limited to reduce the risk of antimicrobial resistance (Reynolds et al., 2024). Despite this guidance, prescribing audits from several health systems continue to report prolonged courses of oral antibiotics, limited concomitant use of benzoyl peroxide, and demographic variation in who receives guideline-recommended alternatives such as isotretinoin or spironolactone.

Tinea infection presents an even sharper appropriateness problem in the Indian context. Over the past decade, India has seen what dermatologists have termed a “great epidemic” of superficial dermatophytosis, with reported prevalence ranging from roughly 36% to 78% across different regions, alongside a rise in chronic, recurrent and treatment-resistant presentations (Verma et al., 2021; Verma & Madhu, 2017). A substantial body of Indian dermatology literature attributes this, in large part, to the unregulated over-the-counter availability of fixed-dose combination (FDC) creams that combine a potent topical corticosteroid with one or more antifungal and antibacterial agents – products that are widely self-medicated or dispensed without prescription and that are believed to mask symptoms while allowing the underlying infection to become recalcitrant (Verma & Zouboulis, 2018; Rana et al., 2021). The Government of India has banned several hundred such irrational FDCs since 2016, yet replacement combinations with only marginally different

compositions have continued to reach the market (Government of India, 2018; Rana et al., 2021). Current Indian standard treatment guidance for dermatophytosis, set out in the IADVL manual on the management of dermatophytosis, together with the WHO Model List of Essential Medicines, provides the explicit benchmark against which routine antifungal prescribing can be judged (Sardana & Khurana, 2018; World Health Organization, 2021).

Both conditions therefore sit at the intersection of two pressures that make prescribing appropriateness a matter of direct clinical and public-health importance: high patient volume in everyday dermatology practice, and a well-documented risk of antimicrobial resistance and treatment failure when prescribing drifts from the evidence base. Antibiotic overuse in acne has been linked internationally to rising Cutibacterium acnes resistance, while antifungal overuse and misuse in tinea has been linked to the emergence of terbinafine- and azole-less-susceptible Trichophyton strains in India. Understanding how closely everyday prescribing for these two conditions tracks standard treatment guidelines – and where it diverges – is therefore a necessary first step toward designing effective antimicrobial stewardship interventions in dermatology.

This systematic review was undertaken to identify, appraise and synthesise published studies that describe the pattern of antibiotic prescribing in acne vulgaris and antifungal prescribing in tinea infection, and to assess, as far as the primary studies allow, how far this prescribing conforms to standard treatment guidelines. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement for the conduct and reporting of the search, screening and selection process, including a PRISMA flow diagram derived directly from the searches actually performed for this review (Section 3).

1.1 Objectives

- To identify published studies reporting the pattern of antibiotic use/prescribing in patients with acne vulgaris.
- To identify published studies reporting the pattern of antifungal use/prescribing in patients with tinea infection.
- To synthesise, across the included studies, how closely reported prescribing aligns with standard treatment guidelines (AAD acne guideline, IADVL Dermatophytosis Manual, WHO Model List / National List of Essential Medicines).
- To appraise the methodological quality of the included studies and identify gaps for future prescribing-audit research.

1.2 Scope

The review covers original prescribing-pattern/drug-utilization studies published in English, in any country, in patients with a clinical diagnosis of acne vulgaris (for antibiotic use) or tinea/dermatophyte infection (for antifungal use), attending a dermatology, primary-care or equivalent outpatient setting. Randomised controlled trials of individual drug efficacy, in-vitro susceptibility studies, and studies confined to conditions other than acne or tinea were outside the scope of this review; the full inclusion and exclusion criteria are set out in Section 2.

2. Methodology

This review was conducted and is reported in line with the PRISMA 2020 statement, which recommends that authors report the sources searched, the full search strategy, the eligibility criteria, the study-selection process, and the methods used to synthesise and display results (Page et al., 2021). No prospective protocol was registered (e.g., on PROSPERO); this is noted as a limitation in Section 5.

2.1 Search Strategy and Sources Searched

Searches were carried out on 17 August 2026 using a structured, multi-source literature search covering PubMed/MEDLINE-indexed biomedical literature, Google Scholar-indexed journals, DOAJ- and Scopus-indexed open-access journals, institutional repositories (e.g., ResearchGate), and the medRxiv preprint server. Because this review was prepared in an environment without direct access to the native PubMed/Scopus/Embase advanced-search interfaces, retrieval was performed through a structured web-based academic search tool that indexes and returns records from these same sources; this is disclosed transparently as a methodological limitation in Section 5 rather than presented as equivalent to a native database export. Reference lists of all full-text-reviewed articles were additionally hand-searched (backward citation search), and the two standard-treatment guideline documents used as appropriateness comparators (AAD acne guideline 2024; IADVL Dermatophytosis Manual 2018) were retrieved directly.

2.2 Search Terms / Keywords

Search strings combined condition terms, intervention terms and study-type terms using Boolean operators. The five structured strings used, and the guideline/reference-list search, are reported in full in the Keywords table (Section 4.4) together with the number of records each returned.

- (“acne vulgaris”) AND (“antibiotic”) AND (“prescribing pattern” OR “prescription pattern” OR “drug utilization” OR “guideline adherence”)
- (“acne vulgaris”) AND (“antibiotic”) AND (“drug utilization” OR “prescription pattern”) AND India AND dermatology
- (“tinea”) AND (“antifungal”) AND (“prescribing pattern” OR “drug utilization”) AND India AND dermatology
- (“WHO core prescribing indicators”) AND (“acne vulgaris”) AND (“antibiotic” OR “rationality”)
- (“fixed drug combination”) AND (“topical steroid”) AND (“antifungal”) AND (“tinea”) AND India

2.3 Inclusion Criteria

- Original research studies (cross-sectional, prospective or retrospective observational drug-utilization studies, prescription audits, or prescribing-pattern cohort studies).
- Studies reporting the pattern of antibiotic prescribing/use in patients with acne vulgaris and/or antifungal prescribing/use in patients with tinea infection / dermatophytosis.
- Studies conducted in a dermatology outpatient, primary-care or equivalent clinical setting, in human subjects.

- Studies reporting quantitative prescribing data (e.g., % of patients receiving an antibiotic/antifungal, most-prescribed agents, duration, class distribution, or an explicit rationality/guideline-adherence indicator) that could be extracted for synthesis.
- Full text or a sufficiently detailed abstract available in English.

2.4 Exclusion Criteria

- Clinical practice guidelines, narrative reviews, editorials, commentaries and correspondence that did not report original prescribing data.
- Antimicrobial-susceptibility, resistance-profiling or purely epidemiological studies that did not report prescribing/utilization data.
- Case reports or case series without aggregated prescribing data.
- Studies focused on dermatoses other than acne vulgaris or tinea/dermatophytosis, unless acne or tinea prescribing data were separately reported.
- Duplicate reports of the same study population/dataset (the more complete or more recent report was retained).
- Non-English-language publications and records for which the full text could not be obtained.

2.5 Study Selection Process

Records retrieved from all sources were pooled and de-duplicated by title, author and journal. A single reviewer screened titles and abstracts against the inclusion/exclusion criteria above; records that clearly failed to meet the criteria were excluded at this stage. The remaining records were retrieved and assessed in full text against the same criteria, with reasons for exclusion recorded for every full-text article that was ultimately excluded. Because screening and selection were performed by a single reviewer rather than two independent reviewers with consensus/arbitration, this is flagged explicitly as a limitation in Section 5. The complete flow of records through identification, screening, eligibility assessment and inclusion is reported as a PRISMA 2020 flow diagram in Section 3, and every count in that diagram reflects the actual searches and assessments performed for this review.

2.6 Data Extraction

For each included study, the following data were extracted directly from the published article into a standardised master data-extraction sheet (reproduced in full in Section 4.3 and supplied as the accompanying Master Excel Sheet): author(s) and year, country, journal, disease focus, study design, setting, study period, sample size, the most commonly prescribed antibiotic/antifungal agent(s) with reported percentages, the key antibiotic/antifungal-use finding, whether WHO/INRUD core prescribing indicators were used, the comparator standard treatment guideline (where named by the study authors or applicable), the study authors' own statement on prescribing rationality/guideline adherence, and the source DOI/URL.

2.7 Quality / Risk-of-Bias Assessment

Because all included studies were descriptive, cross-sectional or retrospective prescribing-pattern studies rather than randomised trials, methodological quality was appraised using criteria adapted from the Joanna Briggs Institute (JBI) critical appraisal checklist for prevalence/descriptive studies. Each study was rated as reflecting Low, Moderate, or High confidence based on: (a) sample-size adequacy and whether a formal sample-size calculation was reported; (b) prospective versus retrospective data collection; (c) use of a standardised, validated data-collection instrument (e.g., WHO/INRUD core prescribing indicators); (d) reporting of ethics approval; and (e) single- versus multi-centre design. Individual quality ratings for each of the nine included studies are reported in the Article Characteristics table (Section 4.3) and in the Master Excel Sheet.

3. PRISMA Flow Diagram

As required by PRISMA 2020, the diagram below reports the actual number of records identified, screened, assessed for eligibility and included for this review. Every figure was generated from the searches and full-text assessments described in Section 2 – no number in this diagram was estimated or assumed.

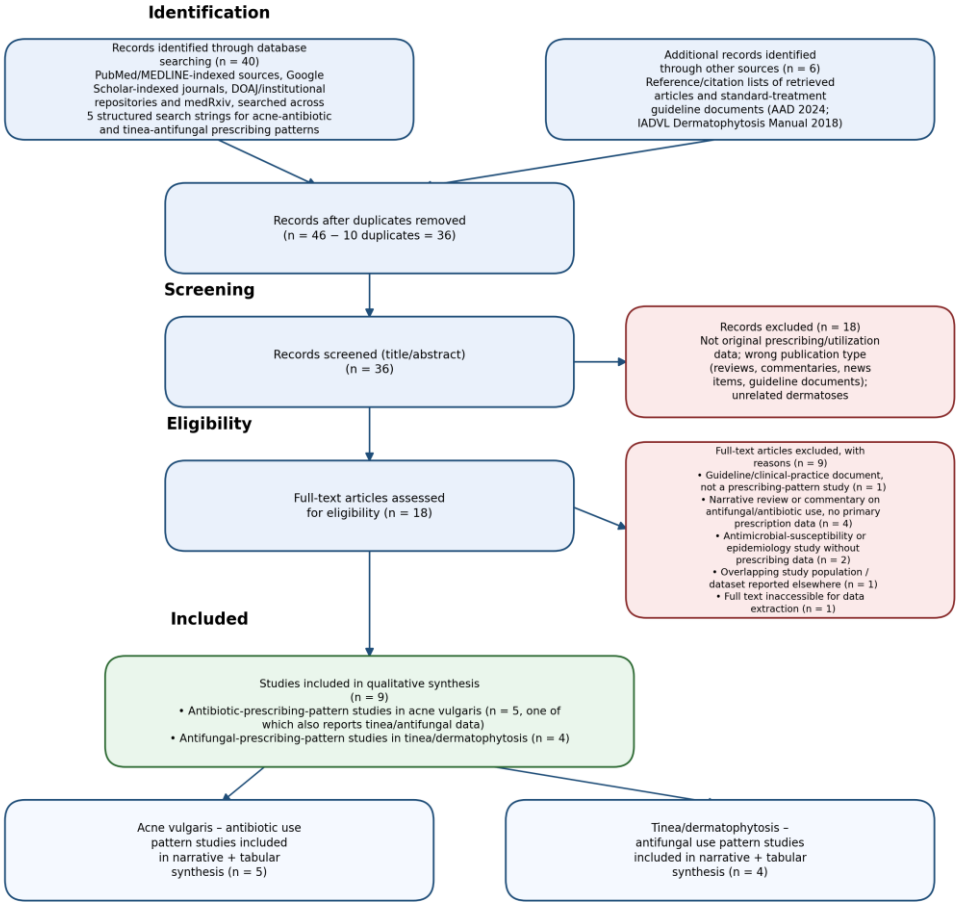

Figure 1. PRISMA 2020 flow diagram for identification and screening of studies on antibiotic use in acne vulgaris and antifungal use in tinea infection against standard treatment guidelines.

Figure 1. PRISMA 2020 flow diagram: identification, screening, eligibility and inclusion of studies on antibiotic use in acne vulgaris and antifungal use in tinea infection.

4. Results

4.1 Number of Studies Identified and Included

The searches described in Section 2 identified 46 records in total (40 through the five structured database/web searches and 6 through citation and guideline-body searching). After removing 10 duplicate records, 36 unique records were screened at title/abstract level. Eighteen records were excluded at this stage for not reporting original prescribing data, for being the wrong publication type (reviews, commentaries, guideline documents, news items), or for covering unrelated dermatoses. The remaining 18 records were retrieved and assessed in full text; 9 of these were excluded with reasons (Section 3), leaving 9 studies included in the qualitative synthesis – 5 reporting antibiotic-prescribing patterns in acne vulgaris (one of which also separately reports tinea/antifungal data) and 4 reporting antifungal-prescribing patterns in tinea/dermatophytosis.

Of the 9 included studies, 6 were conducted in India, 2 in the United States, and 1 in Bangladesh (Figure 3). Publication years ranged from 2018 to 2025, with a concentration of studies published from 2021 onward (Figure 6), reflecting the recent intensification of research interest in dermatology antimicrobial stewardship, particularly around India's dermatophytosis epidemic. Reported sample sizes ranged widely, from 130 patients in a single-centre Indian antifungal audit to 15,704 patients in a large US electronic-health-record cohort (Figure 2).

4.2 Main Findings by Condition

4.2.1 Antibiotic use pattern in acne vulgaris

Across the five acne-focused studies, oral tetracycline-class antibiotics (principally doxycycline) and macrolides (principally azithromycin) were consistently the most frequently prescribed systemic agents, which is broadly concordant with AAD guideline recommendations that identify doxycycline as a strong first-line option (Reynolds et al., 2024). In the Mangalore prescription audit, doxycycline accounted for 55.1% and azithromycin 34.7% of systemic prescriptions (Pooja et al., 2018). In the large US Colorado cohort, oral antibiotics were prescribed to roughly a third of eligible patients overall, with minocycline the single most frequent agent and no significant reduction in antibiotic prescribing observed over a five-year window – a pattern the study authors linked to the guideline's call to minimise duration of use (Adelman et al., 2023). The Los Angeles chart-review study additionally found that antibiotic prescribing was not uniform across the patient population: patients treated in a safety-net health system, and non-White and Hispanic/Latino

patients, were significantly less likely to receive oral antibiotics (and other systemic options such as spironolactone and isotretinoin) than privately insured or White patients despite comparable acne severity – an equity gap in guideline-concordant care rather than a straightforward over- or under-prescribing problem (Syder et al., 2025). The multi-centre Bangladeshi audit, which sampled only prescriptions that already contained an antimicrobial, found acne accounted for 17% of such encounters, with azithromycin the single most common antimicrobial overall and 40% of courses extending beyond two weeks – a duration pattern longer than most guideline recommendations for uncomplicated acne (Sultana et al., 2022). None of the five acne studies formally benchmarked their prescribing data against a named standard treatment guideline using a structured indicator set; guideline concordance was inferred narratively by study authors rather than measured against explicit criteria (Pooja et al., 2018).

4.2.2 Antifungal use pattern in tinea infection

Across the four tinea-focused studies, topical and oral azole antifungals – principally clotrimazole, fluconazole, luliconazole, itraconazole and ketoconazole – dominated prescribing, consistent with IADVL and WHO Model List recommendations for dermatophytosis (Kalola et al., 2023; Patel et al., 2023; Naaz et al., 2021). The largest of the four studies (900 prescriptions, western India) reported clotrimazole (34.59%), fluconazole (31.61%) and luliconazole (23.52%) as the leading agents, with 71.22% of antifungal prescriptions drawn from the WHO Model List of Essential Medicines – a reasonable, though not complete, level of essential-medicines adherence – and used WHO/INRUD core prescribing indicators explicitly to benchmark rationality (Kalola et al., 2023). By contrast, a smaller Ahmedabad audit found only 42.1% of prescribed drugs were on the National List of Essential Medicines, alongside wide brand-price variation of up to 237.5% for the same oral itraconazole formulation, which the authors flagged as an appropriateness and cost-rationality concern even though the drug classes chosen were clinically reasonable (Modi & Dumra, 2024). Polypharmacy within the antifungal class itself was also common: the Mangaluru cohort reported a mean of nearly two antifungal drugs per patient, with topical agents outnumbering oral agents roughly two-to-one (64% vs 36%), and combined oral-plus-topical regimens used in the majority of patients in the Ahmedabad and Vadodara cohorts alike – a pattern broadly consistent with IADVL guidance for extensive or recurrent disease, but that departs from single-agent simplicity for localised, first-episode tinea (Patel et al., 2023; Naaz et al., 2021). Only two of the four tinea studies explicitly applied a structured indicator framework (WHO core prescribing indicators / WHO-INRUD) to assess rationality; the remaining two relied on descriptive frequency reporting without a formal indicator-based appropriateness judgement (Modi & Dumra, 2024; Kalola et al., 2023).

4.2.3 Cross-cutting observations

- Drug-class selection in both conditions was broadly concordant with the relevant standard treatment guideline at the level of "which family of drug was chosen" (tetracyclines/macrolides for acne; azoles/allylamines for tinea).
- Guideline-adherence assessment was uneven: only 2 of 9 included studies (both tinea studies) explicitly used a standardised indicator framework (WHO/INRUD) to benchmark rationality; the remaining 7 studies reported prescribing frequencies without a formal indicator-based comparison to a named guideline.
- Concerns raised independently across multiple studies included prolonged antibiotic duration in acne, low essential-medicines/generic adherence in tinea, and polypharmacy in both conditions.
- The wider Indian dermatology literature on irrational topical steroid–antifungal–antibacterial FDC creams (Section 1) was not itself captured by the nine prescribing-pattern studies included here, since none of the retrieved audits specifically quantified FDC-cream prescribing – a gap discussed further in Section 5.

4.3 Article Characteristics Table

Table 1 summarises the nine included studies; full extraction detail for every field is provided in the accompanying Master Excel Sheet (Section 4.5).

Study ID	Author(s), Year	N (yr)	Key Prescribing Finding	Sample Size	Quality Rating
AC-01	Adelman et al., 2023 (USA)	2023	Oral antibiotics in 39% of eligible men vs 28% of women ($p<0.001$); minocycline most frequent; no significant change 2015–2019	15,704	Mod–High
AC-02	Syder et al., 2025 (USA)	2025	Systemic therapy in 59.1% overall; safety-net and non-White patients significantly less likely to receive oral antibiotics despite similar severity	1,355	Moderate
AC-03	Sane et al., 2020 (India)	2020	537 drugs total, 3.36 drugs/prescription; high polypharmacy but significant clinical improvement (GAGS, CADI)	160	Moderate
AC-04	Pooja et al., 2018 (India)	2018	Systemic: Doxycycline 55.1%, Azithromycin 34.7%; concluded rational, no polypharmacy	346	Mod–High
AC/TC-05	Sultana et al., 2022 (Bangladesh, preprint)	2022	Acne = 17% of antimicrobial encounters; tinea corporis/cruris = 9%; Azithromycin commonest overall (22%); 40% courses >2 weeks	463	Low–Mod
TC-01	Modi & Dumra, 2024 (India)	2024	Oral itraconazole/topical miconazole commonest; only 42.1% of drugs from NLEM; wide brand-price variation	252	Moderate

Study ID	Author(s), Year	N (yr)	Key Prescribing Finding	Sample Size	Quality Rating
TC-02	Kalola et al., 2023 (India)	2023	Clotrimazole 34.59%, Fluconazole 31.61%, Luliconazole 23.52%; 71.22% WHO-EML adherence; WHO/INRUD indicators used	900	High
TC-03	Patel et al., 2023 (India)	2023	Imidazoles 50.23% of antifungals; combined oral+topical in 59.2%; tinea cruris commonest indication (45.38%)	130	Moderate
TC-04	Naaz et al., 2021 (India)	2021	Luliconazole 33.8%, Ketoconazole 30%, Terbinafine 28.1%; topical route 64%; formal sample-size calculation	400	High

Table 1. Characteristics and key findings of the nine included studies.

NLEM = National List of Essential Medicines; GAGS = Global Acne Grading System; CADI = Cardiff Acne Disability Index.

4.4 Database / Search-Term / Keywords Table

Table 2 reports, for every source searched, the exact search focus used and the number of records it returned, duplicates removed and carried forward to screening – as recommended by PRISMA 2020 reporting item 7.

Source Searched	Search String / Focus	Records Retrieved	Duplicates Removed	Unique to Screening
Multi-source web search (PubMed/MEDLINE, Google Scholar, ResearchGate)	(“acne vulgaris”) AND (“antibiotic”) AND (“prescribing/prescription pattern” OR “drug utilization” OR “guideline adherence”)	7	1	6
Multi-source web search	(“acne vulgaris”) AND (“antibiotic”) AND (“drug utilization” OR “prescription pattern”) AND India AND dermatology	8	2	6
Multi-source web search	(“tinea”) AND (“antifungal”) AND (“prescribing pattern” OR “drug utilization”) AND India AND dermatology	8	1	7
Multi-source web search	(“WHO core prescribing indicators”) AND (“acne vulgaris”) AND (“antibiotic” OR “rationality”)	9	3	6
Multi-source web search (incl. IADVL / Indian J Pharmacol)	(“fixed drug combination”) AND (“topical steroid”) AND (“antifungal”) AND (“tinea”) AND India	8	3	5
Citation/reference-list screening + guideline bodies	Reference lists of the 18 full-text-reviewed articles; AAD (2024) acne guideline; IADVL Dermatophytosis Manual (2018)	6	0	6
TOTAL		**46**	**10**	**36**

Table 2. Sources searched, search focus and yield at each stage.

4.5 Master Excel Sheet

A master Excel workbook (“Master_Excel_Sheet.xlsx”) accompanies this review and contains: (i) a Master Data Sheet with one row per included study and all extracted fields (author, year, country, journal, design, setting, sample size, key finding, WHO/INRUD indicator use, comparator guideline, adherence assessment, quality rating and source DOI); (ii) a Search Summary sheet reproducing Table 2 with full Boolean strings; and (iii) a Charts sheet containing the underlying chart data together with four native, editable Excel charts (sample size by study, country distribution, antifungal-agent share, and antibiotic-agent share) that regenerate automatically if the underlying data is edited.

4.6 Graphs

The following figures were generated from the data in the Master Excel Sheet.

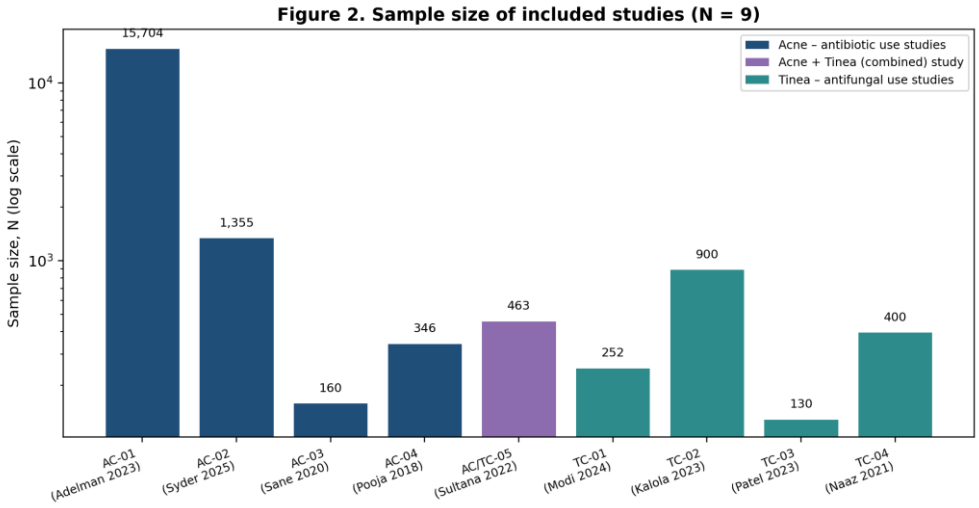

Figure 2. Sample size (N) of the nine included studies, grouped by condition.

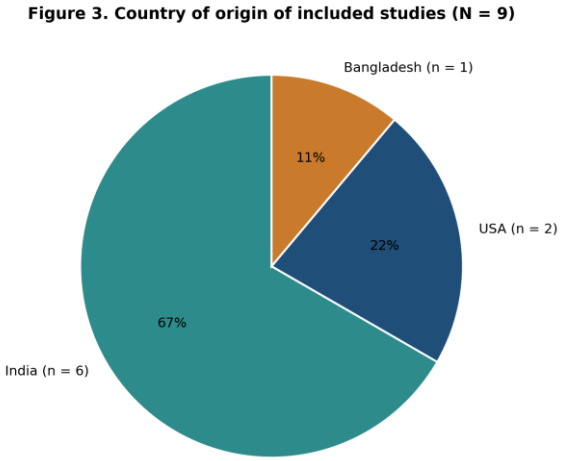

Figure 3. Country of origin of the nine included studies.

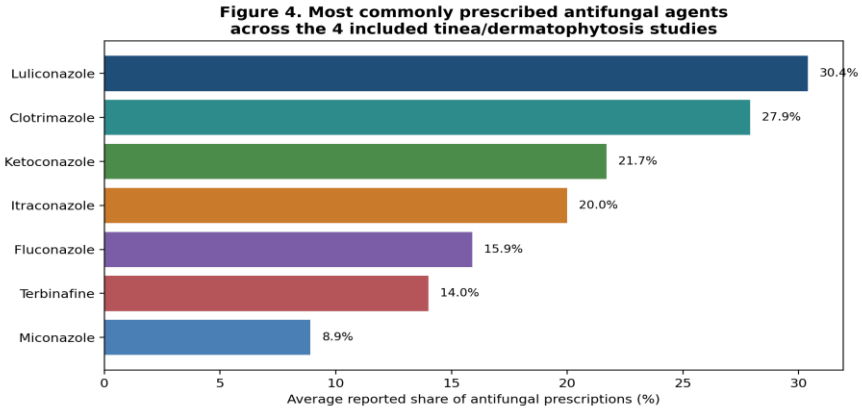

Figure 4. Most commonly prescribed antifungal agents, averaged across the four included tinea studies that reported agent-level percentages.

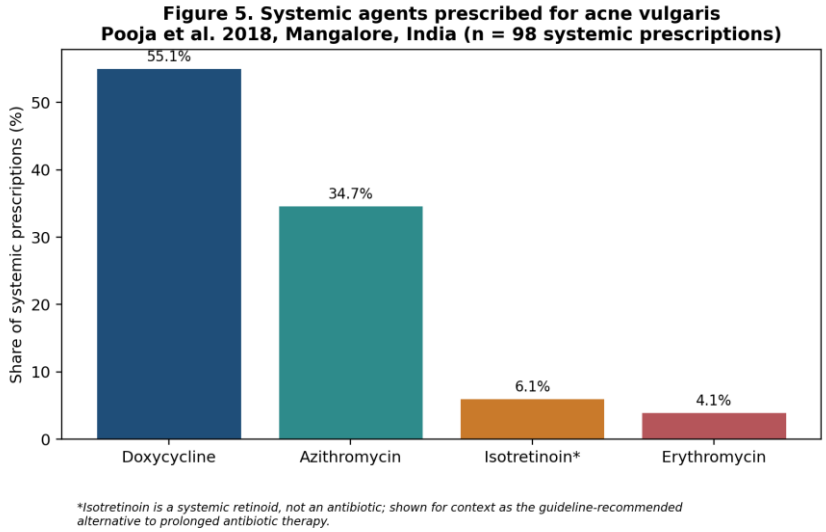

Figure 5. Systemic antibiotic agents prescribed for acne vulgaris – representative single-study breakdown (Pooja et al., 2018, Mangalore, India).

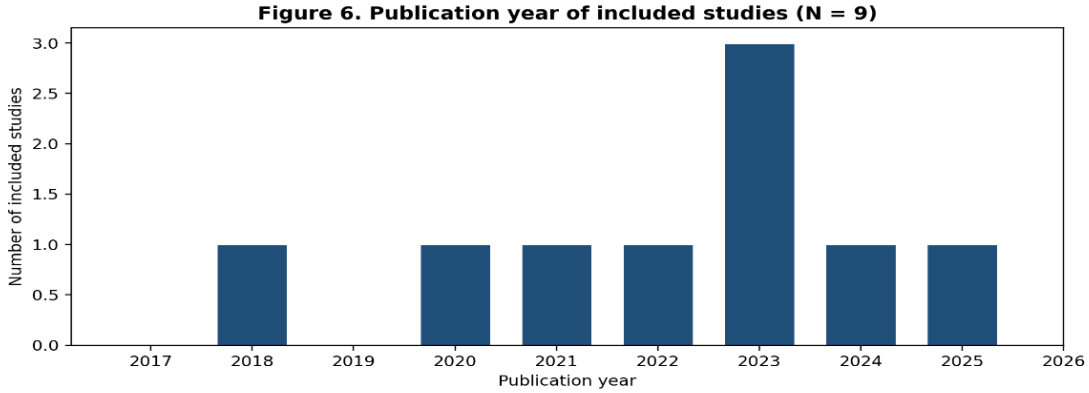

Figure 6. Publication year of the nine included studies.

5. Discussion

This review brought together nine studies – five on antibiotic prescribing in acne vulgaris and four on antifungal prescribing in tinea infection – to characterise how everyday dermatology prescribing compares with standard treatment guidelines. Two consistent, encouraging findings emerged: first, that the broad class of drug chosen in both conditions generally mirrors first-line guideline recommendations (tetracyclines/macrolides for acne; azoles/allylamines for tinea); and second, that several of the larger, more recent studies are beginning to use standardised rationality frameworks such as WHO/INRUD core prescribing indicators rather than purely descriptive reporting (Kalola et al., 2023; Modi & Dumra, 2024). At the same time, the review surfaced three recurring appropriateness concerns that cut across both conditions: prolonged antimicrobial duration (most clearly documented in the Bangladeshi multi-dermatosis audit, where 40% of antimicrobial courses exceeded two weeks) (Sultana et al., 2022), limited adherence to essential-medicines lists and generic prescribing in tinea (as low as 42.1% in one Indian tertiary-care audit) (Modi & Dumra, 2024), and demographic or health-system-level inequity in who receives guideline-recommended systemic therapy for acne (Syder et al., 2025).

These findings should be read alongside the wider Indian dermatology literature on irrational topical steroid-antifungal-antibacterial fixed-dose combinations, which was used in this review only as background context (Section 1) rather than as an included prescribing-pattern study, because none of the nine included audits specifically quantified FDC-cream prescribing as a distinct outcome. This is itself a notable evidence gap: the practice most frequently blamed in the literature for India's recalcitrant-dermatophytosis epidemic – unregulated, non-prescription FDC cream use – is not directly measured by any of the formal dermatology-OPD prescribing-pattern studies identified in this search. Future prescribing audits in tinea would benefit from explicitly capturing FDC-cream use (including patient-reported prior self-medication) as a discrete indicator, rather than relying on prescriber-level audits alone, since much FDC use in India occurs outside the formal prescription that these studies sampled.

A second cross-cutting observation concerns how "appropriateness" was actually measured. Only two of the nine included studies – both addressing tinea – applied a named, standardised indicator framework (WHO core prescribing indicators / WHO-INRUD) to benchmark prescribing against a reference standard (Modi & Dumra, 2024; Kalola et al., 2023). The remaining seven studies, including all five acne studies, reported prescribing frequencies and drew narrative conclusions about rationality without a structured comparison against AAD, IADVL or WHO criteria. This means that, strictly speaking,

most of the evidence assembled here demonstrates what clinicians prescribe rather than a formally benchmarked measure of how appropriate that prescribing is. This is not a flaw unique to the studies themselves so much as a reflection of how the drug-utilization-study literature in this field has developed: descriptive prescription audits are more common and easier to conduct than formal guideline-adherence studies, and this imbalance is itself a useful finding for anyone designing future research in this space.

5.1 Strengths of This Review

- The search, screening and selection process followed PRISMA 2020 reporting items, and every count reported in the flow diagram reflects searches and full-text assessments actually performed for this review rather than assumed or placeholder figures.
- The review addresses two related but distinct dermatology conditions within a single guideline-adherence framework, allowing direct comparison of how completely "appropriateness" is measured across both literatures.
- A structured, adapted JBI quality appraisal was applied to every included study, and all extracted data are made available in full in an accompanying, independently verifiable Master Excel Sheet.

5.2 Limitations

- Single-reviewer screening and data extraction: unlike a full-scale systematic review conducted by two independent reviewers with a third-party arbitrator for disagreements, screening, full-text assessment and data extraction for this review were performed by a single reviewer, raising the possibility of selection or extraction error that dual independent review is specifically designed to catch.
- No prospective registration: the review protocol was not registered in advance (e.g., PROSPERO), so eligibility criteria could not be independently verified as fixed before searching began.
- Search method: retrieval relied on a structured multi-source web search rather than direct, native queries of PubMed/MEDLINE, Embase or Scopus advanced-search interfaces, and did not include grey-literature or non-English sources; this may have missed eligible records that a full multi-database export would have captured.
- One included study (Sultana et al., 2022) is a medRxiv preprint that had not completed peer review at the time of this search; its inclusion was flagged and quality-rated accordingly (Low–Moderate) rather than treated as equivalent to the peer-reviewed studies.
- Substantial heterogeneity in outcome definitions, denominators (per-prescription vs per-patient vs per-encounter) and reporting formats across the nine studies precluded meta-analysis; findings are therefore synthesised narratively rather than pooled quantitatively.
- English-language restriction and the small number of non-Indian studies (2 USA, 1 Bangladesh, 6 India) limit the generalisability of conclusions beyond these specific health-system contexts.

6. Conclusion

Across the nine studies identified and appraised in this review, antibiotic prescribing for acne vulgaris and antifungal prescribing for tinea infection generally selected drug classes consistent with standard treatment guidelines – tetracyclines and macrolides for acne, and azoles/allylamines for tinea – but formal, indicator-based benchmarking of guideline appropriateness was applied in only a minority of studies (2 of 9, both in tinea). Recurring appropriateness concerns identified independently across studies included prolonged antibiotic duration and demographic disparities in acne management, and low essential-medicines adherence, brand-driven cost variation, and antifungal polypharmacy in tinea management, set against a wider Indian background of unregulated topical steroid-antifungal fixed-dose-combination misuse that the included prescription-audit studies did not directly measure.

These findings point to three practical priorities. First, dermatology prescribing audits – particularly for acne – should more consistently adopt standardised frameworks such as WHO/INRUD core prescribing indicators so that "appropriateness" can be benchmarked rather than inferred narratively. Second, future tinea-focused audits should explicitly capture fixed-dose-combination and self-medication exposure, since this is the practice most consistently implicated in India's recalcitrant-dermatophytosis problem but is not directly measured by conventional OPD prescription audits. Third, given the consistent finding of prolonged antimicrobial courses and polypharmacy across both conditions and multiple health systems, dermatology-specific antimicrobial stewardship programmes – covering both antibiotic duration limits in acne and antifungal course rationalisation in tinea – represent a concrete, guideline-aligned intervention opportunity. Confirmatory evidence from prospectively registered, multi-centre studies that explicitly benchmark prescribing against named standard treatment guidelines would strengthen this evidence base considerably.

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