

# Meta-analysis comparing efficacy of antibiotics versus oral contraceptives in acne vulgaris

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**Background:** Both antibiotics and oral contraceptive pills (OCPs) have been found to be effective in managing acne vulgaris. Despite widespread use, few direct comparisons of efficacy between the 2 modalities have been published.

**Objective:** We compared the efficacy of antibiotics and OCPs in managing acne.

**Methods:** A meta-analysis was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses and Cochrane collaboration guidelines.

**Results:** A review of 226 publications yielded 32 randomized controlled trials that met our inclusion criteria. At 3 and 6 months, compared with placebo, both antibiotics and OCPs effected greater percent reduction in inflammatory, noninflammatory, and total lesions; the 2 modalities at each time point demonstrated statistical parity, except that antibiotics were superior to OCPs in percent reduction of total lesions at 3 months (weighted mean inflammatory lesion reduction: 3-month course of oral antibiotic treatment = 53.2%, 3-month course of OCPs = 35.6%, 3-month course of placebo treatment = 26.4%, 6-month course of oral antibiotic treatment = 57.9%, 6-month course of OCPs = 61.9%, 6-month course of placebo treatment = 34.2%; weighted mean noninflammatory lesion reduction: 3-month course of oral antibiotic treatment = 41.9%, 3-month course of OCPs = 32.6%, 3-month course of placebo treatment = 17.1%, 6-month course of oral antibiotic treatment = 56.4%, 6-month course of OCPs = 49.1%, 6-month course of placebo treatment = 23.4%; weighted mean total lesion reduction: 3-month course of oral antibiotic treatment = 48.0%, 3-month course of OCPs = 37.3%, 3-month course of placebo treatment = 24.5%, 6-month course of oral antibiotic treatment = 52.8%, 6-month course of OCPs = 55.0%, 6-month course of placebo treatment = 28.6%).

**Limitations:** Investigative treatment heterogeneity and publication bias are limitations.

**Conclusions:** Although antibiotics may be superior at 3 months, OCPs are equivalent to antibiotics at 6 months in reducing acne lesions and, thus, may be a better first-line alternative to systemic antibiotics for long-term acne management in women. (J Am Acad Dermatol <http://dx.doi.org/10.1016/j.jaad.2014.03.051>.)

**Key words:** acne vulgaris; birth control; meta-analysis; oral antibiotics; oral contraceptive; tetracyclines.

Acne vulgaris is a common inflammatory disease of the follicular portion of the pilosebaceous unit, affecting 40 to 50 million people in the United States alone.<sup>1,2</sup> It is

characterized by a variety of lesions ranging in severity from open and closed comedones of the face in mild cases to folliculopustules, folliculopapules, nodules, and cysts of both face and trunk in

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severe disease.<sup>3</sup> These disfiguring lesions are associated with substantial physical and psychological morbidity.<sup>4,5</sup> The latter is prolonged by the long-lasting postinflammatory pigmentation they frequently leave behind.<sup>6</sup> Given the psychosocial impact of this disease, it is not surprising that acne is one of the most popular reasons for visiting a dermatologist.<sup>7</sup>

Fortunately, various medications have been found to be effective in the management of acne, including oral antibiotics,<sup>8</sup> which for many years have been used to eliminate widespread acne and acne refractory to topical treatments.<sup>9</sup> Antibiotics exert their therapeutic effect via their anti-inflammatory properties<sup>10</sup> and, less importantly, by reducing *Propionibacterium acnes* population in the follicular duct, a key player in the pathophysiology of this disease.<sup>11-13</sup> Given their efficacy,<sup>14</sup> antibiotics remain one of the first-line treatments for acne unresolved by topical medications.

Over the past 30 years, however, the use of combined estradiol-progestin oral contraceptive pills (OCPs) for acne management has been gradually increasing, their appeal augmented by the added benefit of decreasing the risk of undesired pregnancy. The mechanism of action of OCPs, which may be considered more preventive than remedial, is quite dissimilar from that of antibiotics. Their efficacy is credited mostly to the estrogen component, which by reducing the amount of free androgens in the body ultimately down-regulates ductal plugging and sebum production to prevent the formation of new acne lesions.<sup>15-18</sup> More recently, the lower androgenicity and even antiandrogenic activity of the progestin component has also decreased the acnegenic impact of OCPs. The use of OCPs in the management of acne has been highly touted by pharmaceutical companies and, without a doubt, has contributed to the increasing popularity especially among women with acne. Despite their now widespread use, however, there are very few clinical studies directly comparing OCPs and antibiotics in the management of acne. Further, although there have been several different Cochrane reviews analyzing the efficacy of the individual treatments, there is to date no report comparing the two. This review, conducted in

accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement from the Cochrane Collaboration guidelines, aims to compare the efficacy of antibiotics and OCPs versus placebo, via pooled data analysis from multiple randomized controlled trials (RCTs).

## METHODS

### Search strategy

An electronic search using PubMed was conducted with the search terms “acne vulgaris AND oral antibiotics,” “acne vulgaris AND systemic antibiotics,” “acne vulgaris AND oral contraceptives.” In addition, the following filters were placed on the results: RCT, English language, from 1985. The year 1985 was chosen as the limit because the lesions of acne vulgaris did not appear to be

well stratified into inflammatory versus noninflammatory lesions in clinical trials until after that time. Relevant citations were also found by looking at references of review articles and publications of other primary investigations found during the initial search.

### Study selection criteria

The following inclusion criteria were used in selecting RCTs: diagnosis of acne vulgaris using clinical diagnosis or validated diagnostic criteria; delineation of inflammatory versus noninflammatory lesions or report of total lesions; at least 1 investigational arm consisting of treatment with antibiotics or OCPs; baseline inflammatory (papules and pustules), noninflammatory (comedones), and/or total lesion counts or percent reduction of lesions; end points included reduction or percent reduction in lesions; and study drug had to be used for at least 3 months with either graphical or tabulated data in regards to lesion count or percent reduction at 3 months, 6 months, or both. The end point of 3 months was chosen based primarily on the fact that most published studies used 3 months for the treatment duration with oral antibiotics, and it has been posited that maximal improvement with systemic antibiotics is seen between 6 weeks to 3 months.<sup>19-22</sup> Similarly, the time point of 6 months was chosen because most of the OCP studies included in this meta-analysis used a 6-month treatment duration; prior investigations have shown that up to 70% of patients using a combined OCP had

## CAPSULE SUMMARY

- Oral antibiotics and oral contraceptive pills are independently effective in managing acne.
- Oral contraceptive pills rival antibiotics in efficacy after as little as 3 months of treatment and are equivalent in efficacy at 6 months.
- Oral contraceptive pills may be the more appropriate first-line long-term modality in certain female patients.

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