

## RESEARCH LETTER

## The Safety Profile of Acne Supplements: Analysis of Active Ingredients

Sasan D Noveir, BA<sup>1,2</sup>, Jayden Galamgam MD<sup>2</sup>, Carol E Cheng MD<sup>2</sup>

<sup>1</sup> David Geffen School of Medicine at University of California Los Angeles, Los Angeles, California, USA

<sup>2</sup> Division of Dermatology, Department of Medicine, David Geffen School of Medicine at University of California Los Angeles, Los Angeles, California, USA

### ABSTRACT

**Introduction:** Acne treatment options vary widely, with many patients using dietary supplements. Despite their popularity, these products pose safety concerns due to lack of FDA approval for safety or efficacy before release. The US Institute of Medicine sets Tolerable Upper Intake Levels (ULs) for nutrients, but there are no regulatory limits to prevent supplements from exceeding these ULs.

**Methods:** On March 3, 2024, active ingredients from the top 50 best-selling acne supplements were collected from Amazon. Data were analyzed to identify ingredients and the frequency at which their dosages surpassed the ULs for different age groups.

**Results:** The most prevalent active ingredients were zinc (40%), vitamin A (30%), diindolylmethane (DIM) (26%), vitamin E (26%), and selenium (24%). Thirty percent of all supplements contained at least one ingredient exceeding its UL for ages 9 to 13, 20% for ages 14-18, and 16% for ages 19 and older. Twenty-five percent of zinc-containing supplements and 33% of vitamin A-containing supplements exceeded the UL for any all groups.

**Discussion:** Acne supplements frequently contain ingredients that surpass ULs, particularly zinc and vitamin A. Chronic toxicity from these nutrients can lead to significant health issues. Dermatologists should inquire about supplement use when prescribing treatments like isotretinoin to prevent toxicity risks.

### INTRODUCTION

Patients have a wide range of acne treatment options, including the use of supplements as a complementary or alternative method. There is an increasing trend of supplement use in the United States (US) with 57.6% of adults reporting usage.<sup>1</sup> Despite their popularity, these products pose safety concerns.

Unlike pharmaceuticals, dietary supplements in the US are not FDA-approved for safety or efficacy before release. The US Institute of Medicine establishes Tolerable Upper Intake Levels (ULs) for nutrients, indicating the maximum daily intake unlikely to cause adverse effects. However, there are no regulatory limits on supplements to prevent exceeding these ULs.<sup>2-4</sup> This study evaluates the safety of acne supplements by assessing the frequency at which their active ingredients exceed established ULs.

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## METHODS

On March 3, 2024, the top 50 best-selling acne supplements were identified by searching "acne supplement" on the online retail platform, Amazon. For each supplement, the active ingredients and their respective dosages were documented. Data were analyzed to identify the prevalence of specific active ingredients and the frequency at which their dosages surpassed the established ULs for different age groups (ages 9-13, 14-18, and 19 and older). ULs were referenced from the Dietary Reference Intakes provided by the US Institute of Medicine.<sup>2-4</sup>

## RESULTS

The most prevalent active ingredients in the studied supplements were zinc (40%), vitamin A (30%), diindolylmethane (DIM) (26%), vitamin E (26%), and selenium (24%) (**Table 1**).

Thirty percent of all studied supplements contained at least one ingredient surpassing its UL for ages 9 to 13, 20% for ages 14-18 and 16% for ages 19 and older. The mean daily doses of zinc (26.9 mg) and vitamin A (1950.7 mcg) were the most common ingredients to exceed the ULs. Specifically, 25% of zinc-containing supplements and 33% of vitamin A-containing supplements exceeded the UL for age groups.

## DISCUSSION

Acne supplements containing zinc had an average of 26.9 mg, with 25% of these supplements exceeding the UL of all ages. Zinc is believed to have anti-inflammatory

effects on acne, but zinc toxicity can lead to copper deficiency, causing anemia, neutropenia, and neurological symptoms.<sup>3</sup> Doses as low as 25 mg for six weeks have been shown to reduce copper levels in asymptomatic adult men, though the clinical impact remains uncertain.<sup>5</sup>

Vitamin A was the second most common ingredient in acne supplements, with 33% of these supplements exceeding the UL for all ages. Chronic toxicity can cause symptoms such as alopecia, hepatotoxicity, joint pain, ataxia, or elevated intracranial pressure.<sup>3</sup> Due to its fat-soluble properties, prolonged intake even at low doses can lead to toxicity. This risk is greater in individuals with high alcohol intake, pre-existing liver disease, or hyperlipidemia, as the UL does not apply to these populations.<sup>3</sup> Additionally, individuals of childbearing potential should exercise greater caution, since vitamin A supplementation at doses as low as 3,000 mcg/day during pregnancy increases the risk of birth defects.<sup>6</sup> Both vitamin A and isotretinoin, a synthetic form of vitamin A prescribed for moderate to severe acne, carry similar risks. However, isotretinoin is strictly regulated, with requirements that include monthly clinical visits, pregnancy tests, and periodic laboratory monitoring.

This study evaluated best-selling products from a single online retailer, potentially limiting its applicability to the broader supplement market. It also relied on manufacturer-reported supplement values.

This study found zinc and vitamin A to be the most common active ingredients in popular acne supplements, often surpassing their ULs. Dermatologists should ask if patients are taking supplements, especially when prescribing isotretinoin to prevent the risk of vitamin A toxicity. With supplements widely available, patients should be cautious when

**Table 1.** Top 10 Best-Selling Active Ingredients and their Tolerable Upper Intake Levels (ULs).

50 Best-Selling Acne Supplements			Tolerable Upper Intake Levels		
Ingredients	% of supplements	Average daily dose (range), SD	9 - 13 years	14 - 18 years	19+ years
Zinc	40	26.9 mg (2.7 - 100), 23.1	23 mg	34 mg	40 mg
Vitamin A	30	1950.7 mcg (300 - 6100), 1764.1	1700 mcg	2800 mcg	3000 mcg
DIM	26	221.7 mg (100 - 400), 95.8	N/A	N/A	N/A
Vitamin E	26	32.6 mg (5 - 160), 43.4	600 mg	800 mg	1000 mg
Selenium	24	250.7 mcg (5 - 2000), 552.8	280 mcg	400 mcg	400 mcg
Vitamin B5	22	196.7 mg (2 - 750), 256.3	N/A	N/A	N/A
Vitamin C	20	81.7 mcg (17 - 150), 49.1	1200 mcg	1800 mcg	2000 mcg
Chromium	18	76.1 mcg (15 - 150), 38.4	N/A	N/A	N/A
Vitamin B6	18	12.7 mg (0.5 - 35), 13.6	60 mg	80 mg	100 mg
Biotin	16	1459.4 mcg (25 - 5000), 2201.6	N/A	N/A	N/A

"N/A" signifies the absence of an established UL.

choosing products to minimize adverse effects.

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**Corresponding Author:**

Carol E Cheng, MD  
10833 Le Conte Ave  
Los Angeles, CA 90095  
Email: [cecheng@mednet.ucla.edu](mailto:cecheng@mednet.ucla.edu)

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