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Case Report

Effect of Omega-3 Supplementation on Psoriasis Severity: An Evidence-Based Case Report

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A B S T R A C T

Abstrak

Pendahuluan: Psoriasis adalah penyakit kulit inflamasi kronis yang sering dikaitkan dengan morbiditas yang berat serta efikasi yang terbatas dan efek samping yang terbatas dari terapi konvensional. Omega-3, dengan sifat antiinflamasi dan imunomodulatornya, telah banyak diteliti sebagai terapi tambahan yang potensial dalam penanganan psoriasis. Laporan kasus berbasis bukti (Evidence-Based *Case Report*/EBCR) ini bertujuan untuk mengevaluasi efektivitas suplementasi omega-3 dalam meningkatkan luaran klinis pada pasien psoriasis.

Objektif: Menentukan efek suplementasi omega-3 terhadap perubahan skor Psoriasis Area and Severity Index (PASI) pada pasien psoriasis.

Metode: Pencarian literatur dilakukan menggunakan tiga basis data besar: PubMed, Cochrane Library, dan ProQuest. MeSH terms, pencarian lanjutan, serta kriteria inklusi dan eksklusi digunakan untuk seleksi judul dan abstrak setelah duplikasi dihapus *Critical assessment tools* and *levels of evidence* dari artikel terpilih mengacu pada *Oxford Centre for Evidence-Based Medicine.*

Hasil: Tiga tinjauan sistematis dan meta-analisis serta satu uji klinis acak (RCT) memenuhi kriteria PICO dan kelayakan yang telah ditetapkan. Tiga dari studi tersebut menunjukkan penurunan skor PASI yang bersifat moderat namun signifikan secara statistik dengan suplementasi asam lemak omega-3, khususnya ketika dikombinasikan dengan terapi konvensional. Satu studi lainnya menunjukkan efek yang terbatas atau tidak signifikan ketika omega-3 digunakan sebagai monoterapi

Kesimpulan: Suplementasi omega-3 menunjukkan efek positif dalam menurunkan tingkat keparahan penyakit pada pasien psoriasis, yang ditunjukkan dengan perbaikan skor PASI

Kata kunci: *psoriasis, omega-3, Psoriasis Area and Severity Index*

Abstract

Introduction: *Psoriasis is a chronic inflammatory skin disorder often associated with significant morbidity and limited efficacy of conventional treatments, which may also cause adverse effects. Omega-3, with their anti-inflammatory and immunomodulatory properties, have been proposed as a potential adjunctive therapy for managing psoriasis. This evidence-based case report (EBCR) aims to evaluate the efficacy of omega-3 supplementation in improving clinical outcomes in patients with psoriasis.*

Objective: *To determine the effect of omega-3 supplementation on changes in Psoriasis Area and Severity Index (PASI) scores in psoriasis patients.*

Methods: *Literature search was conducted using advanced searching in three large databases: PubMed, Cochrane Library, and ProQuest. MeSH terms, advanced search and eligibility criteria were used for title and abstract screening after removing duplicates. Critical assessment tools and levels of evidence of the final articles are based on the Oxford Center for Evidence-Based Medicine.*

Results: *Three systematic reviews and meta-analyses and one RCTs met the PICO and eligibility criteria that had been set. Three of the studies demonstrated a modest but statistically significant reduction in PASI scores with omega-3 supplementation, particularly when combined with conventional therapies. A study showed limited or non-significant effects when omega-3 was used alone.*

Conclusion*: Omega-3 supplementation demonstrates a beneficial effect in reducing disease severity in patients with psoriasis, as evidenced by improvements in PASI scores.*

Keywords: *psoriasis, omega-3, Psoriasis Area and Severity Index*

What is already known?

Psoriasis is an immune-mediated disease treated by reducing skin inflammation and modulating immune dysregulation.

What does this study add?

Effect of omega-3 supplementation on psoriasis severity

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Introduction

Psoriasis is a chronic inflammatory skin disease mediated by the immune system, with a global prevalence of approximately 2–3% in 2019.[1] Psoriasis can occur at any age, with women tending to experience onset 10 years earlier than men.[2] According to data from the World Health Organization (WHO) in 2014, psoriasis significantly impacts the quality of life due to misdiagnosis, inadequate treatment, and social stigma. This burden was reflected in its contribution to 5.6 million disability-adjusted life-years (DALYs) globally in 2016.[2]

Conventional therapeutic interventions for psoriasis, such as corticosteroids, methotrexate, acitretin, cyclosporine A, and narrowband ultraviolet radiation B phototherapy, are not only inadequate in preventing health complications but also contribute to teratogenicity, skin tumors, and cardiovascular and renal dysfunction. Thus, ongoing efforts to develop alternative interventions for psoriasis and its comorbidities are necessary.[3,4] The involvement of the immune system in psoriasis is now widely recognized. It is a disorder of both the innate and adaptive immune systems, with keratinocytes, dendritic cells, and T cells playing central roles. Treatment of psoriasis typically focuses on reducing skin inflammation and modulating the immune response, which may include the administration of immunonutrient like omega-3.[2]

Omega-3, in particular, show promise as safe and adjunctive treatments for various skin disorders, including psoriasis. The aberrant hyperproliferation of keratinocytes in psoriasis is driven by T-cell activation, which leads to the production of arachidonic acid and subsequent generation of various pro-inflammatory mediators, including prostaglandins, leukotrienes and cytokines.[5,6] Supplementation with omega-3, in a dose-dependent manner, inhibits those proinflammatory mediator.

EPA and DHA reduce inflammation and support skin recovery, and omega-3 have been used alone or with other agents in psoriasis management.[6,7] The severity of psoriasis and the clinical response to therapy are commonly evaluated using the Psoriasis Area and Severity Index (PASI), a composite score that integrates lesion severity (erythema, induration, scaling) and the extent of body surface area affected. This EBCR aimed to evaluate the efficacy of omega-3 supplementation in psoriasis management, with a particular focus on its impact on PASI score improvement.

Case

A 44-year-old female patient was admitted for a psoriasis exacerbation, presenting with erythematous, pruritic, and painful skin for two weeks prior to hospitalization. The patient had a history of psoriasis since adolescence. During her hospital stay, she experienced a fever peaking at 39°C, which persisted for five days. Several inflammatory markers were elevated, including a leukocyte count of 14,000/µL and C-reactive protein (CRP) at 36.2 mg/mL. The patient received oral therapy with Methotrexate and Cetirizine. Topical treatments included Desoximetasone, Fluocinolone, and moisturizers. The patient was referred to a clinical nutrition specialist for nutrition therapy and education appropriate to the patient's condition and to determine whether omega-3 can help improve the patient's clinical outcome, as assessed by PASI score. Following the initiation of omega-3 supplementation at a dose of 1800 mg/day, the patient demonstrated a gradual improvement in PASI score, decreasing from 20.1 at baseline to 14.7 after 8 weeks, and further to 5.6 after 14 weeks of supplementation.

Methods

Clinical question

The clinical question was determined based on this research's population, intervention, comparation and outcome (PICO). The clinical question for this research: could oral omega-3 supplementation improve Psoriasis Area and Severity Index (PASI) score in patients with psoriasis?

P : Adult patients with psoriasis
I : Supplementation of omega-3
C : Placebo
O : Changes in PASI scores

Search Stategy

Literature search was performed using combination of MeSH terms and Title/Abstract on three large databases: Pubmed, Cochrane Library and Proquest (table 1). Search was conducted on January 5th, 2025. The keywords used in the search strategy are adjusted to the components in PICO, with following terms: *psoriasis, omega-3, DHA, EPA* and *Psoriasis Area and Severity Index*. Critical assessment tools and levels of evidence are based on the Oxford Center for Evidence-Based Medicine.

Eligibility Criteria

Inclusion criteria include subjects over 18 years of age with active psoriasis, receiving oral omega-3 supplementation, with outcomes assessed based on changes in PASI scores, and studies with a design of randomized controlled trial (RCT), systematic review or meta-analysis of RCTs. The exclusion criteria are omega-3 supplementation administered topically or via injection, animal study, full-text articles not available, and articles written in languages other than English or Indonesian.

Table 1. Resources and Search Strategy

Database	Terminology	Hits	Eligible
Pubmed	#1 (Psoriasis[MeSH Terms]) AND (Psoriasis[Title/Abstract]) #2 ((omega-3[MeSH Terms]) OR (EPA[MeSH Terms]) OR (DHA[MeSH Terms]) OR (omega-3[Title/Abstract])) #3 ((Psoriasis Area and Severity Index[MeSH Terms]) OR (PASI[MeSH Terms])) OR (Psoriasis Area and Severity Index[Title/Abstract]) #1 AND #2 AND #3	14	2
Cochrane	#1 psoriasis #2 omega-3 OR EPA OR DHA #3 Psoriasis Area and Severity Index #4 #1 AND #2 AND #3	10	1
Proquest	((omega-3 OR EPA OR DHA) AND (psoriasis) AND ("psoriasis area severity index"))	42	1

Results

A literature search was conducted using PubMed, Cochrane Library, and ProQuest, yielding 66 studies. After removing duplicates from studies published in the past five years using Covidence, 35 articles remained. These were screened based on title and abstract using predefined PICO criteria, resulting in 5 articles for further eligibility assessment. A comprehensive review led to the exclusion of study, leaving 4 for critical appraisal: systematic review/meta-analysis by Clark et al. (2019), Yang SJ. (2019), Chen et al. (2020), and a randomized controlled trial by Tveit et al. (2020). The search and selection process is summarized in Figure 1. Critical appraisal was conducted using the validity and relevance criteria, following the Centre for Evidence-Based Medicine (CEBM) guidelines for therapeutic studies (table 3 and 4).

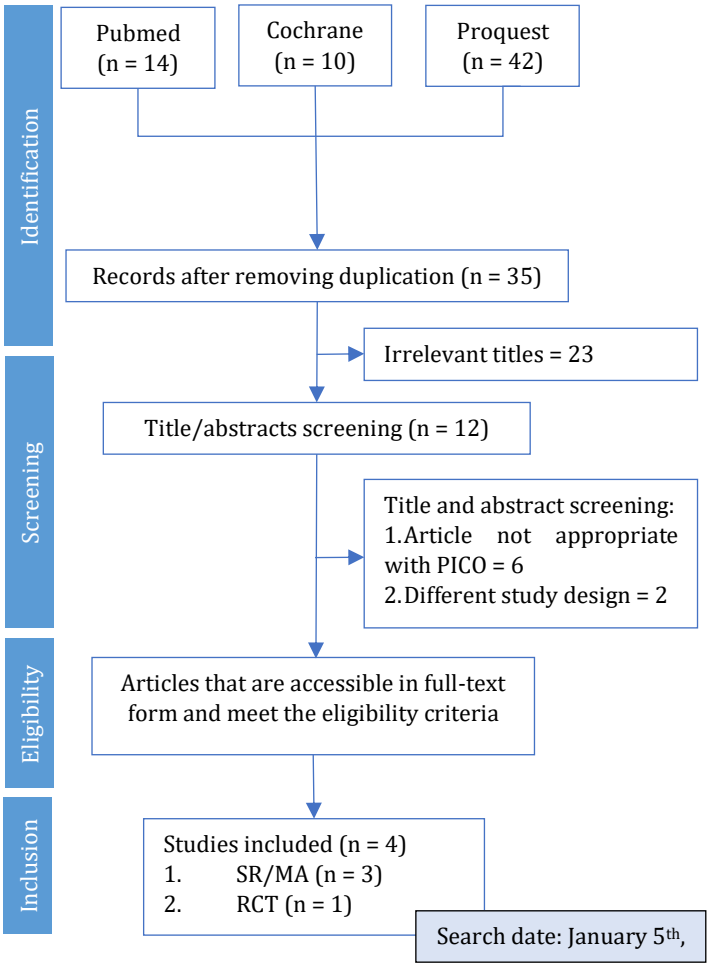

Figure 1. Literature Search Flow

Table 2. Study Characteristic

Article	Study design	Population	Intervention	Outcome	Key results
Clark et al.[6] (2019)	Meta-analysis of 10 RCTs with 560 subjects	Psoriasis patient	Omega-3 supplementation, with EPA doses ranging from 0.24 to 5.4 g/day and DHA from 0.132 to 3.6 g/day, was administered over treatment periods of 4 to 48 weeks, with a median duration of 8 weeks.	Improvement in PASI score	The meta-analysis indicated a significant reduction in PASI score by −1.58 (95% CI: −2.24 to 0.92; P < 0.001) in favor of omega-3 group. Subgroup analysis highlighted that supplementation with dosages of >1800 mg/day and <8 weeks in duration was associated with more beneficial outcome.
Yang SJ and Chi CC[8] (2019)	Meta-analysis of 13 RCTs with 625 subjects	Psoriasis patient	Omega-3 supplementation, providing 1.8–3.6 g/day of EPA and 1.2–2.4 g/day of DHA, was administered over treatment durations ranging from 8 to 24 weeks.	Improvement in PASI score	Omega-3 supplement did not significantly reduce the severity of psoriasis when assessed by PASI score (mean difference − 0.28; 95% confidence interval − 1.74 to 1.19).
Chen et al.[7] (2020)	Systematic review and Meta-analysis of 18 RCTs with 972 subjects	Psoriasis patient	Consumption of Omega-3, alone or in combination with conventional treatments with duration of treatment 2 weeks to 9 months	Improvement in PASI score	Omega-3 combined with conventional treatments, however, resulted in a decreased PASI score (mean difference [MD], -3.92; 95% CI -6.15 to -1.69; P=0.0006)
Tveit et al.[9] (2020)	RCT on 64 subjecs	Psoriasis patient with PASI score <10	Herring roe oil (HRO) 10 caps/day (contain omega-3 292 mg/caps) for 26 weeks	Improvement in PASI score	There was a statistically significant improvement in the mean PASI score with HRO treatment compared to placebo treatment with a mean change in PASI score estimated to −1.1 with a 95% confidence interval < −2.2, −0.025>, p = 0.0451.

SR, systematic review; MA, meta-analysis; RCT, randomized controlled trial; CI, confidence interval; PASI, Psoriasis Area and Severity Index

Tabel 3. Validity Criteria

	Study design	Number of patient	Randomization	Similarity treatment and control	Blinding comparable treatment	Domain	Determinant	Measurement of outcomes	Quality of evidence*	Level of evidence**
Clark et al. [6]	+	+	+	+	+	+	+	+	High	1a
Yang SJ and Chi CC[8]	+	+	-	+	?	+	+	-	Low-moderate	1b
Chen et al. [7]	+	+	-	+	-	+	+	+	moderate	1b
Tveit et al.[9]	+	+	+	+	?	+	+	+	moderate	1b

* Quality of evidence according to GRADE guidelines, https://www.ncbi.nlm.nih.gov/pubmed/21208779
** Level of evidence according to Oxford Center of Evidence-based Medicine (CEBM), http://www.cebm.net.
+ Clearly mentioned in the article; - not done; ? not stated clearly

Tabel 4. Relevance Criteria

	Similarity population	Similarity determinant/intervention	Similarity outcome
Clark et al. [6]	+	+	+
Yang SJ and Chi CC[8]	+	+	+
Chen et al. [7]	+	+	+
Tveit et al.[9]	+	+	+

DISCUSSION

Psoriasis is driven by chronic inflammation involving both innate and adaptive immune responses, with dysregulated lipid mediator signaling playing a key role. Omega-3, have been shown to attenuate psoriatic inflammation by competing with arachidonic acid in enzymatic pathways, thereby reducing the production of pro-inflammatory eicosanoids such as prostaglandin E2 (PGE2). Additionally, these fatty acids downregulate the expression of inflammatory cytokines including TNF-α, IL-1β, IL-6, and IL-17, while modulating T cell functions by suppressing Th17 responses and altering dendritic cell antigen presentation. DHA, for instance, can reduce the adherence of T cells to endothelial cells, further limiting immune cell infiltration into psoriatic lesions. The cumulative effects of omega-3 intake suggest a potential therapeutic role in mitigating the immune dysregulation and inflammatory pathways central to psoriasis pathogenesis.[5,10]

The clinical efficacy of omega-3 in psoriasis has been explored in several randomized controlled trials (RCTs) and meta-analyses. Clark et al.[6] reported a statistically significant improvement in Psoriasis Area and Severity Index (PASI) scores (mean difference –1.58; 95% CI: –2.24 to –0.92; $p < 0.001$), particularly in erythema and scaling. The most pronounced effects were observed at daily doses exceeding 1800 mg and with treatment durations under eight weeks, supporting their use as short-term monotherapy. In contrast, a meta-analysis by Chen et al. [7] found no significant benefit of omega-3 monotheraphy ($p = 0.47$); but when used in conjunction with standard treatments, Omega-3 supplementation led to a significant reduction in PASI scores (mean difference –3.92; 95% CI: –6.15 to –1.69; $p = 0.0006$). Omega-3 was well tolerated and also conferred benefits related to cardiometabolic risk reduction, aligning with the shared Th1-dominant inflammatory profile of both psoriasis and metabolic syndrome.[7,11]

The differing outcomes between Clark et al. and Chen et al. on omega-3 monotherapy in psoriasis likely stem from methodological variations. Clark included studies with higher EPA/DHA doses and focused on short-term treatment (median 8 weeks), revealing significant PASI improvements, while Chen did not report dosage details or perform subgroup analysis, and included longer, more variable treatment durations (2 weeks to 9 months), which may have diluted potential effects. Additionally, both used different control groups, further contributing to inconsistent findings.

Expanding on this, a randomized, double-blind, placebo-controlled trial by Tveit et al.[9] evaluated the efficacy of herring roe oil (HRO)—a novel source of omega-3 rich in phospholipid-bound DHA and EPA in a natural 3:1 ratio. Participants received 10 capsules daily, delivering 292 mg of total omega-3, with approximately 35% bound to phospholipids. After 26 weeks, HRO supplementation significantly reduced PASI scores, particularly in patients with baseline PASI >5.5. However, no significant improvements were noted at earlier time points (weeks 6, 12, and 18). Adverse effects, including nausea, diarrhea, and abdominal pain, were mild and comparable to placebo, suggesting a favorable safety profile.

Nevertheless the overall body of evidence remains inconsistent. Yang et al. [8] found no statistically significant improvement in PASI scores (mean difference –0.28; 95% CI: –1.74 to 1.19) and reported substantial heterogeneity ($I^2 = 57\%$) among included studies, underscoring the variability in clinical response and the influence of methodological differences. This heterogeneity—ranging from differences in dosing regimens (1–4 g/day), trial duration, baseline disease severity, and use of concomitant therapies—limits the generalizability of findings and complicates direct comparison across studies.

Taken together, evidence from mechanistic studies, randomized controlled trials, and meta-analyses reveals a complex and evolving understanding of omega-3 efficacy in psoriasis, it exhibit immunomodulatory and anti-inflammatory effects that may translate into clinical benefit in

psoriasis, particularly when combined with standard treatments. EPA potency appears to be a key determinant of efficacy, and the phospholipid-bound delivery model explored by Tveit et al. offers a promising strategy to enhance bioavailability. Across the literature, dosing regimens have ranged from 1 to 4 g/day, with treatment durations spanning 8 to 26 weeks.

Achieving therapeutic doses of omega-3 through diet alone is often impractical, as it requires daily consumption of large portions of fatty fish like salmon or herring, which may be inconsistent, costly, and culturally limiting. Moreover, long-term intake of such quantities increases the risk of mercury and contaminant exposure, particularly with certain fish.[12] Omega-3 supplements offer a safer, more reliable alternative by providing precise, purified doses without added calories or toxins, ensuring better adherence and consistent therapeutic benefit—making supplementation a more practical and clinically sound approach for long-term use.[13]

However, several limitations across existing studies warrant consideration when interpreting the efficacy of omega-3 supplementation in psoriasis. These include substantial variability in dosing regimens (ranging from 1 to 4 g/day), inconsistent treatment durations, and heterogeneity in study designs—particularly in the choice of comparators, with some trials using placebo controls and others including active treatments. Additionally, few studies monitored serum omega-3 levels to confirm adherence or assess bioavailability, and there is a lack of long-term safety data beyond 26 weeks. To strengthen the evidence base, future research should prioritize standardized dosing protocols, uniform treatment durations, and the inclusion of objective inflammatory biomarkers to better characterize therapeutic response and optimize clinical applicability.

Conclusion

Omega-3 exhibit promising immunomodulatory and anti-inflammatory properties that may offer therapeutic benefit in the management of psoriasis. Evidence synthesized from three meta-analyses and one RCT included in this evidence-based case report suggests that omega-3 supplementation, when used as an adjunct to standard therapy at doses ranging from 1 to 4 g/day over treatment durations of 8 to 26 weeks, may lead to a reduction in Psoriasis Area and Severity Index (PASI) scores. However, to better establish clinical efficacy and optimize treatment strategies, future studies should employ standardized dosing protocols, consistent intervention durations, and robust outcome measures.

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