

Short Communication

Effectiveness of Olive Oil Administration on Stretch Mark Reduction in Postpartum Women

Siti Nurwendah¹, Riyaen Sari Manullang¹, Marni Br Karo^{1*}, Puji Raharja Santosa², Riris Ocktryna Silitonga³

¹ Department of Midwifery and Midwifery Profession, Sekolah Tinggi Ilmu Kesehatan Medistra Indonesia, Jl. Cut Mutia Raya No. 88A Sepanjangjaya Bekasi, 3200, Indonesia; ² Departemen of Nursing Science, Sekolah Tinggi Ilmu Kesehatan Medistra Indonesia, Jl. Cut Mutia Raya No. 88A Sepanjangjaya Bekasi, 3200, Indonesia; ³ Department of Professional Nursing, Sekolah Tinggi Ilmu Kesehatan Medistra Indonesia, Jl. Cut Mutia Raya No. 88A Sepanjangjaya Bekasi, 3200, Indonesia.

ABSTRACT

Background: Stretch marks manifest as hyperpigmented dermal lesions that commonly occur during pregnancy. These cutaneous changes frequently cause physical discomfort and psychological distress among postpartum women, leading to diminished self-esteem and social withdrawal. Nonpharmacological interventions, particularly olive oil application, are potentially effective management approaches. **Objective:** This study evaluated the efficacy of topical olive oil in reducing stretch mark visibility among postpartum women in the Karang Mulya Community Health Center service area in 2024. **Methods:** This quantitative investigation employed a quasiexperimental design with pre- and posttest assessments. The participants included 45 postpartum women on postpartum day 6 residing within the Karang Mulya Health Center catchment area in March 2024. A total sampling technique was used, and data collection relied on standardized observational assessment tools. Statistical analysis was performed via the Mann-Whitney test ($p < 0.05$). **Results:** The baseline assessment revealed a mean stretch mark severity score of 3.87 (SD=1.407) before olive oil application, which decreased significantly to 1.07 (SD=0.799) after the intervention. The experimental group demonstrated a statistically significant improvement compared with the control group ($p < 0.001$), confirming marked differences in the visibility of stretch marks following olive oil treatment. **Conclusion:** Topical olive oil application significantly reduces stretch mark visibility in postpartum women. These findings support the implementation of this technique as a safe and accessible nonpharmacological intervention in postpartum care protocols for stretch mark management.

KEYWORDS

Postpartum care, striae gravidarum, olive oil, dermal regeneration, nonpharmacological intervention

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Muhamad Frendy
Setyawan, S.Si.,
M.Ked.Trop.

CORRESPONDENCE

Marni Br Karo
Department of
Midwifery and
Midwifery Profession,
Sekolah Tinggi Ilmu
Kesehatan Medistra
Indonesia;
marnikaro.stikesmi@gmail.com

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INTRODUCTION

Pregnancy and childbirth induce profound physiological transformations in women's bodies, with the postpartum period characterized by numerous adaptations that may cause significant discomfort if not properly addressed through appropriate care protocols [1,2]. Among these physiological changes, dermatological alterations are a prevalent concern for postpartum women worldwide. Oakley and Patel [3] reported that hyperpigmentation manifesting as striae gravidarum (commonly known as stretch marks) develops prominently during pregnancy across the breasts, abdomen, and hips, eventually transforming into permanent silvery lines that rarely disappear completely despite partial fading over time.

Epidemiological data from the World Health Organization indicate that approximately 66% of women develop stretch marks during pregnancy. In Indonesia, the reported incidence remains substantial at 55% of all pregnancies [4,5]. The global prevalence of gravidarum varies considerably, with studies documenting that gravidarum occurrence ranges from 50–90% among pregnant women across different populations. Beyond the evident physical manifestations, stretch marks frequently precipitate psychological consequences, including diminished self-esteem and social embarrassment [6,7]. Furthermore, these dermatological changes often produce pruritus, which, when excessively scratched, can compromise skin integrity and potentially lead to secondary infections or complications [8,9].

Current management approaches for stretch marks encompass both pharmacological and nonpharmacological interventions [10]. The established pharmacological treatments include laser therapy and topical application of 0.05% tretinoin cream, whereas the application of olive oil is a prominent nonpharmacological option [11,12]. The therapeutic potential of olive oil derives from its rich phytochemical composition, particularly its high vitamin E content [13–16]. Quantitative analysis revealed that 100 g of virgin olive oil contained approximately 14.39 mcg of α -tocopherol, representing approximately 96% of its vitamin E. This high concentration of fat-soluble vitamin E provides significant antioxidant properties that protect cellular structures against oxidative damage by free radicals, supporting dermal regeneration and tissue repair [17].

Previous studies by Syahida et al. [18] and Astikasari [19] examined the efficacy of olive oil in reducing postpartum stretch marks through studies involving 15 participants who applied olive oil twice daily over a 15-day intervention period. These findings demonstrated a statistically significant improvement in the appearance of stretch marks following olive oil application. Similarly, comparative research on the relative effectiveness of olive oil versus a combination of olive oil and potato extract involved 20 participants equally distributed between the control (olive oil only) and experimental (olive oil with potato extract) groups. The results confirmed the independent efficacy of olive oil in reducing the visibility of postpartum stretch marks [20,21]. Despite these promising findings, most existing studies have utilized relatively small sample sizes and varied methodological approaches, limiting the generalizability of the results and highlighting the need for more robust investigations.

A preliminary investigation conducted within the Karang Mulya Health Center catchment area revealed that all 20 surveyed postpartum women reported stretch marks, underscoring the pervasiveness of this condition and the need for accessible interventions to address it. While existing research suggests the potential efficacy of olive oil, there is insufficient evidence regarding optimal application protocols, duration of treatment, and expected outcomes in diverse populations. Therefore, this study aims to evaluate the effectiveness of standardized olive oil application in reducing stretch mark visibility among postpartum women in the Karang Mulya service area, with implications for developing evidence-based, nonpharmacological interventions that can be readily incorporated into routine postpartum care practices across primary health care settings.

MATERIALS AND METHODS

Study design and setting

This quasi-experimental study with pre- and posttest assessments was conducted from January to March 2024 at the Karang Mulya Community Health Center in Bekasi, Indonesia. This study

evaluated the effectiveness of olive oil in reducing postpartum stretch marks via standardized intervention protocols and objective outcome measurements.

Participants and sampling

The study recruited 45 day–6 postpartum women through total sampling methodology and divided them into three equal groups (n=15 each): no intervention control, standard moisturizing cream control, and olive oil experimental groups. Sample size determination was based on power analysis (80% power, $\alpha=0.05$, effect size 0.6). Women with dermatological conditions, connective tissue disorders, endocrine abnormalities, or hypersensitivity to the intervention materials were excluded.

Data collection instruments and procedures

Data collection employed validated questionnaires (Cronbach's $\alpha = 0.83$) to capture demographic information, obstetric history, and skin characteristics. Stretch mark assessment was performed via the Atwal scoring method, which evaluates quantity, pigmentation, and distribution (composite score 0-9). Trained researchers with verified interrater reliability (Cohen's $\kappa = 0.91$) performed all the assessments. The experimental group received 1 cc of extra virgin olive oil applied twice daily for 14 days, with adherence monitored through self-reported logs and weekly verification.

Ethical considerations

The study was approved by the Ethics Committee of STIKes Medistra (approval number: 421.3/107.113). All participants provided written informed consent and documentation in their native language. Confidentiality was maintained through data deidentification protocols, and the participants were informed of their right to withdraw without consequences.

Statistical analysis

Data analysis via SPSS Inc. USA version 25.0 included Shapiro-Wilk normality testing and the appropriate descriptive statistics. Between-group comparisons were performed via ANOVA or the Kruskal-Wallis test for continuous variables and the chi-square test for categorical variables. Primary outcome analysis used chi-square or Fisher's exact tests ($\alpha=0.05$), supplemented by effect size calculations (Cohen's d) and repeated measures analysis for within-subject changes

RESULTS

Demographic characteristics of the participants

The study was conducted at the Karang Mulya Community Health Center and examined 45 postpartum women on day 6 postdelivery; these women were equally distributed across three intervention groups. Demographic analysis revealed remarkable homogeneity in the maternal age distribution across all groups. In the olive oil intervention group, 14 participants (93.3%) fell within the optimal reproductive age range of 20-35 years, with only one participant (6.7%) exceeding 35 years. Both control groups cream application and no intervention demonstrated complete age-range uniformity, with all 15 participants (100%) between 20 and 35 years.

The parity distribution showed notable variations between the groups. Within the olive oil intervention cohort, multiparous mothers constituted the largest segment, with seven participants (46.7%), followed by primiparous mothers (n=5, 33.3%) and grand multiparous mothers (n=3, 20%). The cream application control group exhibited similar distribution patterns, with 6 multiparous (40%), 5 primiparous (33.3%), and 4 grand multiparous participants (26.7%). Interestingly, the no-intervention control group demonstrated a substantially different parity profile, with primiparous mothers representing the majority (n=10, 66.7%), followed by multiparous (n=4, 26.7%) and grand multiparous (n=1, 6.7%) women. This substantial between-group variation in parity distribution represents a potential confounding variable that warrants

consideration in the interpretation of intervention efficacy. The detailed demographic characteristics are presented in [Table 1](#).

Table 1. Distribution of maternal characteristics

Group (s)	Methods					
	Olive oil		Cream		Neutral	
	f	%	f	%	f	%
Age (years old)						
20-35	14	93,3	15	100	15	100
>35	1	6,7	0	0	0	0
Paritas						
Primi	5	33,3	5	33,3	10	66,7
Multi	7	46,7	6	40	4	26,7
Grande	3	20	4	26,7	1	6,7

Intervention effects on stretch mark reduction

A comprehensive analysis of the stretch mark measurements revealed distinct patterns of change across the three intervention groups. At baseline, the olive oil intervention group presented a mean stretch mark severity score of 3.87 (SD=1.407), with considerable variation, as evidenced by the range (minimum=2, maximum=6). Following the 14-day application protocol, this group demonstrated remarkable improvement, with the mean severity score decreasing to 1.07 (SD=0.799), representing a 72.4% reduction in stretch mark visibility. Individual responses varied considerably, with some participants achieving complete resolution (minimum score, 0) and others showing moderate improvement (maximum score, 3).

The cream application control group presented the highest baseline severity (mean=4.6, SD=0.986, range=3-6), indicating potentially more pronounced stretch marks at study commencement. Postintervention assessment revealed modest improvement, with the mean score decreasing to 3.6 (SD=0.828, range=2-5), representing a 21.7% reduction. The limited efficacy of standard moisturizing creams suggests that mere hydration provides insufficient therapeutic benefits for stretch mark resolution.

The no-intervention control group maintained consistent stretch mark presentations throughout the study period, with identical pre- and posttest measurements (mean=3.47, SD=0.516; range=3-4). This stability in the no-intervention group serves as a critical reference point, confirming that spontaneous resolution of stretch marks does not occur within the two-week timeframe examined and validating the therapeutic effects observed in the intervention groups. The complete intervention outcomes are presented in [Table 2](#).

These findings provide compelling evidence for the superior efficacy of olive oil in reducing postpartum stretch mark visibility compared with that of standard moisturizing cream and no intervention. The observed difference in treatment response likely stems from the unique biochemical composition of olive oil, particularly its high concentration of vitamin E and other antioxidants, which potentially enhance dermal regeneration processes.

Table 2. Average fading of stretch marks in postpartum women

Stretch mark value	N	Mean	Min	Max	Std. Deviation	p-value
Control group (with cream)						
Pre test	15	4,6	3	6	0,986	0.000 ***
Post test	15	3,6	2	5	0,828	
Control group (without cream)						
Pre test	15	3,47	3	4	0,516	0.000 ***
Post test	15	3,47	3	4	0.516	
Experimental group (olive oil)						
Pre test	15	3,87	2	6	1,407	0.000 ***
Post test	15	1,07	0	3	0.799	

Remarks: The p-value is less than 0.05, and the significance level is 95%.

DISCUSSIONS

This study demonstrated that olive oil application significantly reduced stretch mark visibility in postpartum women, with mean severity scores decreasing from 3.87 to 1.07 over the 14-day intervention period, representing a 2.8-point reduction. Bivariate analysis revealed statistically significant differences between the olive oil intervention group and both the moisturizing cream group and the no-intervention group ($p=0.000$). These findings align with emerging evidence supporting natural interventions for dermatological concerns during the postpartum period, offering a more accessible alternative to conventional pharmacological approaches.

Current stretch mark management approaches encompass a spectrum of interventions, ranging from advanced pharmacological treatments to natural remedies. Established medical interventions include pulsed dye laser therapy (585 or 598 nm wavelength) and topical retinoid application, which often entail significant financial commitment and potential side effects [22,23]. Additionally, these treatment modalities frequently require multiple clinical visits and specialized equipment, limiting their accessibility, particularly in resource-constrained settings such as India. Alternative approaches include the use of natural substances such as olive oil, vitamin E cream, cocoa butter, and aloe vera lotion, which target the underlying structural changes in dermal collagen [24,25]. Dermal collagen serves as the architectural framework that maintains skin integrity, elasticity, and moisture retention capacity, with adequate collagen function facilitating epidermal regeneration and consequently reducing the appearance of stretch marks [26–29].

Olive oil, derived from *Olea europaea* fruit, is a multifunctional therapeutic option with established dermatological benefits [30]. Its ability to reduce stretch marks appears to be mediated by multiple bioactive compounds, predominantly its high vitamin E content and potent antioxidant properties. The tocopherol components in olive oil provide dermal protection against oxidative stress while simultaneously enhancing epithelial moisture retention, maintaining dermal elasticity, and mitigating premature collagen degradation [31,32]. Furthermore, transepidermal penetration of olive oil facilitates direct interaction with deeper dermal structures, potentially stimulating fibroblast activity and collagen synthesis [33,34].

Handayani et al. [35] and Miharti and Fitrishia [20] reported comparable findings regarding the efficacy of olive oil in reducing stretch mark visibility. The observed therapeutic effects likely stem from the synergistic action of multiple bioactive components rather than a single constituent. In addition to its vitamin E content, which provides antiaging and skin-tightening properties [37], olive oil provides comprehensive dermatological benefits, including surface moisturization and smoothing effects [35]. The squalene component intrinsic to olive oil plays a multifaceted role in maintaining dermal health by enhancing moisture retention, preventing desiccation, stimulating cellular regeneration in damaged tissues, and moderating inflammatory responses associated with the development of striae gravidarum [38,39]. These combined mechanisms potentially address multiple pathophysiological aspects of stretch mark formation, including altered collagen configuration, diminished elastin function, and compromised dermal hydration [40].

Nurulisma et al. [36] corroborates our findings, demonstrating greater mean reductions in stretch mark severity among postpartum women receiving olive oil application than among control subjects. Their bivariate analysis yielded a significance value of 0.005, confirming the influence of olive oil on postpartum stretch mark reduction. The consistency of the findings across multiple independent investigations strengthens the evidence supporting the therapeutic potential of olive oil for this common postpartum concern.

From a clinical implementation perspective, olive oil is an optimal therapeutic option for postpartum stretch mark management because of its practical advantages. In addition to its documented efficacy, olive oil is economically accessible, has straightforward self-administration protocols, is widely available across diverse geographical contexts, and has an exceptional safety profile with minimal adverse effects. These characteristics address the critical barriers to treatment adherence often encountered in postpartum populations, including financial constraints, limited healthcare access, competing childcare responsibilities, and heightened concerns regarding intervention safety during lactation. While our findings provide compelling evidence for the efficacy of olive oil in reducing stretch marks, future research should address the

remaining knowledge gaps, including dose-response relationships, optimal administration protocols, potential interactions with constitutional factors such as skin type or genetic predisposition, and long-term outcomes beyond the immediate postpartum period.

Clinical implications

The findings of this study have several actionable implications for clinical practice in maternal healthcare settings. Healthcare providers can confidently recommend olive oil as a cost-effective and accessible intervention for postpartum stretch marks, particularly in resource-limited environments where advanced dermatological treatments remain inaccessible. Implementation can occur through structured patient education during antenatal visits and immediate postpartum care, with an emphasis on proper application techniques to maximize efficacy. Primary care facilities and community health centers should consider incorporating olive oil therapy into standard postpartum care protocols, potentially through demonstration sessions during routine postnatal checkups. Additionally, midwives and community health workers can be trained as implementation agents to extend the reach of interventions beyond formal healthcare settings, thereby addressing equitable access concerns. The minimal risk profile of olive oil application makes it particularly suitable for breastfeeding mothers, who may have heightened concerns regarding topical treatments during lactation. Furthermore, this intervention offers psychological benefits beyond physical outcomes, as improved skin appearance may contribute to enhanced maternal self-image and potentially mitigate postpartum depression risk factors related to body-image concerns.

Limitations

The relatively small sample size ($n=45$) distributed across the three intervention groups limits the statistical power and generalizability to broader populations. The intervention duration of 14 days, while sufficient to demonstrate initial efficacy, precludes the evaluation of long-term outcomes and optimal treatment duration. Potential confounding variables, including genetic predisposition to stretch marks, baseline skin characteristics, nutritional status, and hydration levels, were not comprehensively controlled. The study relied on the Atwal scoring method, which, while standardized, represents a semiquantitative approach that may introduce elements of subjectivity despite efforts to maintain interrater reliability. Furthermore, the biochemical mechanisms underlying the observed clinical improvements were not investigated, leaving questions regarding the precise pathophysiological pathways unaddressed.

CONCLUSIONS

This investigation demonstrated that topical olive oil application significantly reduces postpartum stretch mark visibility compared with standard moisturizing cream or no intervention, with the experimental group showing a 72.4% reduction in severity scores following a 14-day treatment. The natural composition of olive oil, particularly its high vitamin E and squalene contents, appears to enhance dermal regeneration through multiple complementary mechanisms, including moisture retention, collagen protection, and anti-inflammatory effects. These findings support the integration of olive oil application into standard postpartum care practices as an evidence-based and accessible alternative to more costly pharmacological interventions. The advantages of this intervention extend beyond clinical efficacy to include practical benefits such as affordability, availability, simple administration protocols, and an excellent safety profile, which are particularly valuable in resource-constrained healthcare environments. While acknowledging the methodological limitations, this study provides meaningful evidence supporting nonpharmacological approaches to common postpartum dermatological concerns. Future research should build upon these findings through larger-scale investigations with extended follow-up periods to establish optimal treatment protocols and evaluate long-term outcomes, further strengthening the evidence base for this promising intervention in maternal health care.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: SN, RSM; Methodology: SN, RSM; Software: SN, RSM; Validation: MBK, RSM; Formal analysis: SN, RSM, MBK; Investigation: SN, RSM, MBK; Resources: MBK PRS, ROS; Data Curation: MBK PRS, ROS; Writing - Original Draft: SN, RSM, MBK PRS, ROS; Writing - Review & Editing: SN, RSM, MBK PRS, ROS; Visualization: SN; Supervision: MBK.

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REFERENCES

- [1] Yuliana. W & Hakim B. N. Emodemo dalam asuhan kebidanan masa nifas. Takalar: Yayasan Ahmar Cendekia Indonesia; 2020.
- [2] Chauhan G, Tadi P. Physiology, postpartum changes. Treasure Island (FL): StatPearls Publishing; 2020:1–7. <https://www.ncbi.nlm.nih.gov/books/NBK555904/>
- [3] Oakley AM, Patel BC. Pathophysiology Treatment/Management. Treasure Island (FL): StatPearls Publishing; 2025:1–6. <https://www.ncbi.nlm.nih.gov/books/NBK436005/>
- [4] Safitri. I. Effectiveness of olive oil on the appearance of stretch marks in third trimester pregnant women at Purwakarta Community Health Center. Thesis. Universitas Islam Sultan Agung, 2021. https://repository.unissula.ac.id/23894/2/32102000012_fullpdf.pdf
- [5] Ulya R, Sunesni, Yohana Suganda, Mekar Zenni Radhia. The effect of topical virgin coconut oil on striae gravidarum prevention and severity: A randomized controlled trial. Eureka Herba Indonesia 2024;5:481–91. <https://doi.org/10.37275/ehi.v5i3.124>.
- [6] Karhade K, Lawlor M, Chubb H, Johnson TRB, Voorhees JJ, Wang F. Negative perceptions and emotional impact of striae gravidarum among pregnant women. Int J Womens Dermatol 2021;7:685–91. <https://doi.org/10.1016/j.ijwd.2021.10.015>.
- [7] Awal Permata F, Khairiah R. The effectiveness of using coconut oil, aloe vera and sirih kapur to prevent striae gravidarum in third trimester pregnant women in the working area of the Cilograng Health Center in 2022. Int J Health Pharmaceut 2023;3:701–6. <https://doi.org/10.51601/ijhp.v3i4.237>.
- [8] Meisura. P.T, Triana. A. Using olive oil to treat striae gravidarum. J Kebidanan 2022;1(2): 82–92. <https://doi.org/10.58794/jubida.v1i2.209>
- [9] Karhade K, Lawlor M, Chubb H, Johnson TRB, Voorhees JJ, Wang F. Negative perceptions and emotional impact of striae gravidarum among pregnant women. Int J Womens Dermatol 2021;7:685–91. <https://doi.org/10.1016/j.ijwd.2021.10.015>.
- [10] Wiguna KAA, Siregar SP. Honey as a wound dressing on superficial partial-thickness burn injury in a resource-limited setting: An EBCR at Ende General Hospital. Svāsthya Trends Gen Med Public Health 2024;1:e73. <https://doi.org/10.70347/svsthya.v1i3.73>.
- [11] Putri EF, Enny Y. The effect of olive oil on reducing striae gravidarum in pregnant women. J Educat Innov Public Health 2023;1(4):86–103. <https://doi.org/10.55606/innovation.v1i4.1845>
- [12] Bagheri M, von Kohout M, Fuchs PC, et al. How to evaluate scar colour after burn injuries - A clinical comparison of the Mexameter® and the subjective scar assessment (POSAS/VSS). Burns 2024;50(3):691–701. <https://doi.org/10.1016/j.burns.2023.11.010>.
- [13] de Oliveira NM, Machado J, Chéu MH, Lopes L, Criado MB. Therapeutic potential of olive leaf extracts: a comprehensive review. Applied Biosci 2024;3:392–425. <https://doi.org/10.3390/applbiosci3030026>.

- [14] Jimenez-Lopez C, Carpena M, Lourenço-Lopes C, Gallardo-Gomez M, Lorenzo JM, Barba FJ, et al. Bioactive compounds and quality of extra virgin olive oil. *Foods* 2020;9:1014. <https://doi.org/10.3390/foods9081014>.
- [15] Wolde R, Mahamed SA. Antibacterial activity of apis mellifera bees honey, garlic extracts and their combinations against salmonella in Wolayta Sodo, Southern Ethiopia. *Svāsthya Trends Gen Med Public Health* 2024;1:e25. <https://doi.org/10.70347/svsthya.v1i2.25>.
- [16] Gonçalves M, Aiello A, Rodríguez-Pérez M, Accardi G, Burgos-Ramos E, Silva P. Olive Oil Components as novel antioxidants in neuroblastoma treatment: Exploring the therapeutic potential of oleuropein and hydroxytyrosol. *Nutrients* 2024;16:818. <https://doi.org/10.3390/nu16060818>.
- [17] WHO. Vitamin E - Fact Sheet for health professionals. Dietary supplement fact sheets 2021:1–16. <https://ods.od.nih.gov/factsheets/VitaminE-HealthProfessional/> (accessed March 13, 2025).
- [18] Syahida et al. Efektivitas pemberian olive oil terhadap pengaruh stretch mark pada ibu nifas di Desa Matang Seulimeng Kota Langsa. *J Edukes* 2023;6 (1).
- [19] Astikasari ND, Mufida RT, Natalia S. The use of olive oil for reducing the complaint of itching related to striae gravidarum in pregnant women. *J Ners* 2020;15:466–9. <https://doi.org/10.20473/jn.v15i1Sp.20510>.
- [20] Miharti S.I, Fitriahia. A. Efektivitas pemberian minyak zaitun dan ekstrak kentang terhadap pemudaran stretch mark pada ibu nifas. *Maternal Child Health Care J* 2020;2 (1):245. <https://doi.org/10.32883/mchc.v2i1.1038>
- [21] Soltanipour F, Delaram M, Taavoni S, Haghani H. The effect of olive oil and the Saj® cream in prevention of striae gravidarum: A randomized controlled clinical trial. *Complement Ther Med* 2014;22(2):220–225. <https://doi.org/10.1016/j.ctim.2013.11.011>.
- [22] mcdaniel DH, ash K, zukowski M. Treatment of stretch marks with the 585-nm flashlamp-pumped pulsed dye laser. *Dermatol Surgery* 1996;22:332–7. <https://doi.org/10.1111/j.1524-4725.1996.tb00326.x>.
- [23] Wehner M, Korgavkar K, Chren M-M, Stuart S, Vaiyavatjamai P, Jaturapatporn D, et al. Interventions for established stretch marks. *Cochrane Database Syst Rev* 2017;2017:CD010926. <https://doi.org/10.1002/14651858.CD010926.pub2>.
- [24] Al-Atif H. Collagen supplements for aging and wrinkles: A paradigm shift in the fields of dermatology and cosmetics. *Dermatol Pract Concept* 2022;12:1–10. <https://doi.org/10.5826/dpc.1201a18>.
- [25] Campos LD, Santos Junior V de A, Pimentel JD, Carregã GLF, Cazarin CBB. Collagen supplementation in skin and orthopedic diseases: A review of the literature. *Heliyon* 2023;9:1–10. <https://doi.org/10.1016/j.heliyon.2023.e14961>.
- [26] Gardeazabal L, Izeta A. Elastin and collagen fibres in cutaneous wound healing. *Exp Dermatol* 2024;33:e15052. <https://doi.org/10.1111/exd.15052>.
- [27] Conradt G, Hausser I, Nyström A. Epidermal or dermal collagen vii is sufficient for skin integrity: insights to anchoring fibril homeostasis. *J Invest Dermatol* 2024;144:1301–1310.e7. <https://doi.org/10.1016/j.jid.2023.11.003>.
- [28] Reilly DM, Lozano J. Skin collagen through the lifestages: importance for skin health and beauty. *Plast Aesthet Res* 2021;8:2. <https://doi.org/10.20517/2347-9264.2020.153>.
- [29] Elsaie ML, Baumann LS, Elsaie LT. Striae distensae (stretch marks) and different modalities of therapy. *Dermatol Surgery* 2009;35:563–73. <https://doi.org/10.1111/j.1524-4725.2009.01094.x>.
- [30] González-Acedo A, Ramos-Torrecillas J, Illescas-Montes R, Costela-Ruiz VJ, Ruiz C, Melguizo-Rodríguez L, et al. The benefits of olive oil for skin health: study on the effect of hydroxytyrosol, tyrosol, and oleocanthal on human fibroblasts. *Nutrients* 2023;15:1–13. <https://doi.org/10.3390/nu15092077>.
- [31] Saras T. Minyak zaitun “khasiat sehat dan kecantikan dari raja minyak alam.” Semarang: Tiram Media; 2023.
- [32] Lorenzo F, Sandra D, Vincenzo C, Angela Z, Isabella T, Francesca V, et al. The nutraceutical value of olive oil and its bioactive constituents on the cardiovascular system. Focusing on

- main strategies to slow down its quality decay during production and storage. *Nutrients* 2019;11. <https://doi.org/10.3390/nu11091962>.
- [33] Brito S, Baek M, Bin B-H. Skin structure, physiology, and pathology in topical and transdermal drug delivery. *Pharmaceutics* 2024;16:1403. <https://doi.org/10.3390/pharmaceutics16111403>.
- [34] Lin T-K, Zhong L, Santiago J. Anti-Inflammatory and skin barrier repair effects of topical application of some plant oils. *Int J Mol Sci* 2017;19:70. <https://doi.org/10.3390/ijms19010070>.
- [35] Handayani et al. The effect of olive oil application on fading of stretch mark in post partum mothers. *J Kebidanan Malahayati* 2024; 10 (5): 476-482. <https://doi.org/10.33024/jkm.v10i5.11906>
- [36] Nurulisma S, Sefira M, Sofia D. Lulur daun pegagan sebagai perawatan badan untuk mengatasi stretch mark. *Garina* 2022; 14(2): 160–175. <https://doi.org/10.69697/garina.v14i2.21>
- [37] Pérez AG, León L, Pascual M, de la Rosa R, Belaj A, Sanz C. Analysis of olive (*Olea europaea* L.) genetic resources in relation to the content of Vitamin e in virgin olive oil. *Antioxidants* 2019;8. <https://doi.org/10.3390/antiox8080242>.
- [38] Budisari A, Margareta C, Siswanti. Penatalaksanaan striae gravidarum menggunakan minyak zaitun pada ibu hamil primigravida trimester III. *JALA* 2024;10(1): 20-23. <https://doi.org/10.70371/jala.v10i1.127>
- [39] Taheri M, Amiri-Farahani L. Anti-Inflammatory and restorative effects of olives in topical application. *Dermatol Res Pract* 2021;2021. <https://doi.org/10.1155/2021/9927976>.
- [40] Lu P, Ruan D, Huang M, Tian M, Zhu K, Gan Z, et al. Harnessing the potential of hydrogels for advanced therapeutic applications: current achievements and future directions. *Signal Transduct Target Ther* 2024;9:166. <https://doi.org/10.1038/s41392-024-01852-x>.