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Benefits of combination of VCO liniment and prevention of post sectio caesarea infection wounds

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Abstract---Objective: This literature review aims to determine the benefits of VCO and chicken fat oil on the prevention of post-section cesarean wound infection. Methods: Based on several databases of literature search results, with. The keywords selected in the search were "chicken oil", "VCO", and "prevention of post SC wound infections," including incision wounds, burns, decubitus wounds, and perineal wounds. Screened based on the title 2010-2022 and full text availability. Results: VCO contains lauric acid (48%), myristic (18%), palmitic (9%), caprylic (8%), capric (7%), oleic acid (6%), linoleic (2%), and stearate (3%). and chicken fat oil has the largest fatty acid content, respectively, namely oleic acid (38.35%), palmitic acid (27.24%), linoleic acid (16.36%) and palmitoleic acid (7.01%), which function as anti-cancer activity, antibacterial and immunomodulatory, anti-inflammatory, moisturization, it can heal chronic inflammation of skin wounds and increase skin hydration. Conclusion: the combination of chicken oil and VCO will be more visible so that it can offer wound care with complementary products and as an innovation to prevent post sectio caesarea infection wounds

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Keywords---VCO, Chicken fat oil, Sectio Caesarea

Introduction

Sectio Caesarea is a delivery that makes an incision in the abdominal wall and uterine wall with an incision, is intact and carries a number of risks associated with moderate to severe postoperative pain[1], with a risk of 25 times greater than vaginal delivery, so it requires special attention [2]. According to the World Health Organization (WHO), the average cesarean section delivery in the number of developing countries is increasing rapidly every year, 5-15% per 1000 births in the world with the prevalence of CS increasing by 46% in China and 25% in Europe, Latin America and Asia[3].

In Indonesia, the number of deliveries by Sectio Caesarea reaches around 30-80% of the total deliveries according to the 2007 national survey data, which is 927,000 out of 4,030,000 deliveries.[4]. Based on the results of the Basic Health Research (Riskesdas) in 2018, the prevalence of cesarean delivery was 17.6 percent, the highest in the DKI Jakarta area (31.3%) and the lowest in Papua (6.7%)[5].

Physiologically, wound healing after sectio caesarea ranges from 10 days to 14 days, while the uterus recovers approximately 3 months and the healing time of sectio caesarea continues for 1 year or more[6]. The impact that can be obtained from the post Sectio caesarea action is bleeding and the problem of leukocytosis/wound infection in the post partum[7]. This is because the abdominal wall incision surgery will cause rupture of the membrane in the subcutaneous area of the abdomen, problems with haemostasis in blood circulation[5]. The causes of leukocytosis in postpartum mothers include internal factors, namely age, parity, nutritional status, and anemia and external factors, namely the inflammatory process, drugs and the type of delivery [8].

Efforts that can be made to prevent the occurrence of post sectio Caesarea infection can be given with conventional therapy and complementary therapy. Medicinal therapy generally uses antibiotics that have been shown to be effective for prophylaxis, namely cefoxitin, cefotetan, third-generation cephalosporins and broad spectrum penicillins[9]. The use of antiseptics in the form of neomycin, gentamicin, tobramycin, iodine[10]. However, the use of antibiotics that are not in accordance with the rules can cause resistance, while the use of antiseptics in wound care can have allergic side effects and inhibit the growth of collagen. To reduce the risk of inappropriate use of antibiotics[11], other treatment are needed, namely complementary therapy.

Complementary medicine is a development between traditional therapy and integrates with modern therapy. The results of these integrated therapies have passed clinical trials, sohey have been equated with modern medicine[12]. Complementary therapies have also been shown to have an effective role in the healing of skin wounds [13]. In order to support the innovation of wound healing therapy with complementary medicine, this literature will look at the benefits of VCO and broiler chicken oil”

to support the innovation of wound healing therapy with complementary medicine literature in Coconut oil is traditionally produced into VCO through a wet coconut oil extraction system without chemicals and further processed through a purification, bleaching, and deodorizing process (RBD. Several studies have found the content of coconut oil consists of lauric (48%), myristic (18%), palmitic (9%), caprylic (8%), capric (7%), oleic acid (6%), linoleic (2%), and stearic (3%)i will see the benefits of VCO and broiler chicken oil"[14]. Coconut oil has also been commonly used. According to several other studies that have reported the therapeutic effect of Virgin coconut oil on wounds, it contains anti-inflammatory, analgesic, and antipyretic activity[15].

Broiler chicken fat oil contains fatty acids with a percentage of 36.3% saturated fatty acids and 62.3% unsaturated fatty acids.[16]. Fat is a source of essential nutrients and the main energy store in the body. Polyunsaturated fatty acids contain essential acids that are important for health but must be supplied from the diet, namely linolenic and linoleic acids. Animal-derived fatty acids offer pharmacological benefits to improve skin barrier protection and to accelerate wound healing through rapid epithelialization [17]

Based on the above description, VCO and chicken fat oil have been linked as natural anti-oxidants and bactericides, their ability to play an effective role in accelerating wound closure. This review explores clinical and scientific research investigating the efficacy of liniment in the prevention of Post Sectio Caesarea wound infections and various other skin disorders. The main objective was to use the scientific literature to evaluate the potential efficacy of VCO and chicken fat oil in complementary treatments.

Method

This research method is in the form of a literature review aimed at obtaining a theoretical basis that can support solving the problem being researched and revealing various theories that are relevant to the cases found.

Based on the literature search results in the database, researchers found 339 articles using Google Scholar and Pubmed. The keywords selected in the search "VCO", "chicken oil", and "prevention of post-SC wound infection" include incision wounds, burns, decubitus wounds, perineal wounds, and surgical wounds. Furthermore, the search results obtained were screened based on the title 2010-2022 and the availability of full text and then obtained as many as 250. Then, as many as 64 articles were excluded because they did not meet the inclusion criteria, and 25 articles were obtained.

Result

Based on the results of the literature selection, there were 17 studies on VCO and 8 studies on chicken oil using experimental methods, manuscripts, research articles (Table 1) experimental and research articles (Table 2)

Table 1. summary of VCO research articles

no	Article title/ author/ year/ location	Research method/population	Intervention	Research result
1	The Effect of Giving Virgin Coconut Oil (VCO) To Accelerate The Healing Process Of Perineal Wounds In Post Partum Mothers [18] Mifta Putri Fatimah, Tiara Fatrin, Dwi Yanti (2021) Palembang, Indonesia	Pre-experimental method with the design or research design is two groups, the control group and the intervention with a population of 10 postpartum mothers	- perineal wound care using virgin coconut oil as many as 5 respondents with a percentage of 50% - Perineal wound care by not using virgin coconut oil as many as 5 respondents with a percentage of 50%. Wound healing was assessed by the change in the REEDA sign as reflected in the change in score.	- The frequency distribution of perineal wound healing time using virgin coconut oil (VCO) at Independent Practice Midwife Ferawati Palembang was categorized as fast on average 5 days, namely 100%. - The frequency distribution of perineal wound healing time with Management of Normal Delivery treatment at Independent Practice Midwife Ferawati Palembang is categorized as slow on average 8 days, namely 100%
2.	The Effectiveness of Ozonated VCO on Wound Healing Full Thickness Skin Graft Autologous Rat Sprague Dawley [19] Johan Rinto Even , Hardian , Najatullah (2021) Semarang, Indonesia	Experimental study on 40 rats	- Groups A1 and A2 as treatment 1 received 50.4 mg/ml ozonated VCO oil once per day - Groups B1 and B2 as treatment 2 get 103.2 mg/ml of ozonated VCO oil once per day - Groups C1 and C2 as treatment 3 received 204.0 mg/ml ozonated VCO oil once per day. - Ozonated VCO oil was given on the first day after full thickness skin graft autolog treatment, then observed for 12 days	Topical ozonated virgin coconut oil was effective in improving the healing process of FTSG wounds in Sprague Dawley rats in terms of macroscopic changes in the wound (wounds that close tightly, good take on skin graft wounds), an increase in the number of fibroblast proliferation (on day 6 and day 12). compared to the control group), the FTSG wound healing process was seen from the increase in VEGF expression (on the 6th and 12th day compared to the control group).
3.	Virgin Potential Coconut Oil (VCO) In Synergy Herbal Oil (MHS) Against Diabetic Ulcer [20] Putri Dafriani, Niken Niken, Nyak Ramadhani, Roza Marlinda (2020) Sumatera barat. indonesia	quantitative research by design quasi-experiment using two groups of respondents. group consists of 8 respondents	- Group 1 = control group who were given wound care using 0.9% NaCl solution. - Group 2 = intervention group who were given wound care using MHS from Herbal Penawar Al-Wahida Indonesia (HPAI). DM ulcers were cleaned using MHS as much as 10-30 cc (according to the size of the wound).	Wound treatment using MHS has the ability to reduce the surface area of the wound, as well as wound care using 0.9% NaCl. The advantages of using MHS are that it is easy to obtain and contains anti-pain and anti-inflammatory properties, thereby increasing the healing of DM ulcers. This is because MHS contains various compounds, especially flavonoids which are anti-inflammatory, antibacterial and antioxidant. The use of MHS can be done at home for diabetic ulcer clients
4.	Antibacterial Effect of Virgin Coconut Oil on Methicillin Resistant Staphylococcus Aureus [21] Tirta Darmawan Susanto, Muchtan Sujatno, Kuswinarti, Hendro Sudjono Yuwono (2015) Jawa barat, indonesia	laboratory experimental research. using infection test with MRSA	- In Group I, the dermis layer was incised with an area of 3 cm x 3 cm, infection was induced with MRSA suspension which had a Mac Farland 8 concentration of 0.25 cc; given food and drink. - In Group II, the dermis layer was incised with an area of 3 cm x 3 cm, infection was induced with MRSA suspension which had a Mac Farland 8 concentration. as much as 0.25 cc; given food and drink + virgin coconut oil orally at a dose of 3 cc / day. - Group III was performed with an incision in the dermis layer of 3 cm x 3 cm, infection induction with MRSA suspension which had a Mac Farland 8 concentration of 0.25 cc; given food and drink + topical virgin coconut oil at a dose of 0.4 cc / day.	- Wounds given topical VCO therapy shrunk faster (dry), compared to wounds treated with VCO orally. VCO by topical administration of MRSA-infected wounds can accelerate wound healing - Oral and topical VCO therapy can reduce the number of leukocytes in the blood. The number of blood leukocytes will increase in the presence of infection - the administration of topical VCO therapy resulted in a significant decrease in the number of bacteria from the swab results. Based on these results, it appears that VCO has antibacterial properties against MRSA
5.	Effect of Virgin Coconut Oil Application on Increasing the Number of Fibroblasts in Post Tooth Extraction Wounds in Rattus Novergicus [22] Anggun Hibah Jannah Tamara, Yayun Siti Rochmah, Rochman Mujayanto (2014)	The type of research used is quasi-experimental with a post-test control group design. The research subjects were 15 Rattus novergicus rats	- K1 was given the application of povidone iodine - K2 applied VCO topical with the preparation of emulgel - K3 applies VCO orally	The application of VCO to the wound after tooth extraction caused an increase in the number of fibroblast cells, virgin coconut oil (VCO) was able to increase the number of fibroblasts 0.4 times more than povidone iodine. and the administration of VCO by oral application is more effective and gives significant results on the number of fibroblasts compared to topical applications

	Semarang, indonesia			
6.	Ameliorative Effects of VCO on Heterophiles of AI-vaccinated Broilers [23] Enny Yusuf Wachidah Yuniwarti (2017) Semarang, indonesia	The research design used was a completely randomized design. With a sample of 40 broiler chickens	- group 1 chickens vaccinated with AI without VCO - group of 2 chickens vaccinated with AI by giving 6 ml of VCO per kg of feed, - group of 3 chickens vaccinated with AI with 12 ml VCO per kg of feed, - group of 4 chickens vaccinated with AI with 15 ml VCO per kg of feed, - a group of 5 chickens vaccinated against AI with 18 ml VCO per kg of feed, - group of 6 chickens that were not vaccinated against AI without VCO, - group of 7 chickens that were not vaccinated against AI by giving 6 ml of VCO per kg of feed, - group of 8 chickens that were not vaccinated against AI with 12 ml VCO per kg of feed, - group of 9 chickens that were not vaccinated against AI with 15 ml VCO per kg of feed, - group of 10 chickens that were not vaccinated against AI with 18 ml VCO per kg of feed	ten treatments with four replications, showed no significant difference between treatments on the number of heterophile broilers, so that the number of heterophils could not be increased, either given VCO or not given VCO, also vaccinated with AI or not vaccinated against AI
7.	Comparison of the Effectiveness of Virgin Coconut Oil and Triamcinolone Acetonide in	Experimental study on 30 male Rattus norvegicus strain Wistar	- Control, performed abrasion of the cecum (AS) and parietal peritoneum which is directly opposite the cecum,	- some mice (n = 14, or 47%) did not show any surgical wounds with adhesions (macroscopic) or fibrosis (microscopic)

	Prevention of Intraperitoneal Adhesion in Rats [24] Marven Stevano Ayawaila, Ishak Lahunduitan, Ferdinand Tiandra, Fima Fredrik Langi, Sri Adiani (2021) Manado, indonesia		- in the area of abrasion given VCO 1 m - in the area of abrasion given Triamcinolone Acetonide (Flamicort®) 0.3 mg	- All 16 mice with fibrosis were categorized as mild and thin (level 1) according to Yilmaz classification. - In Zuhlke's macroscopic distribution, three-quarters (n = 12) of the mice with adhesion were classified as grade 1 (light and thin adhesion) or 2 (strong adhesion but still easily released fibrin fibers).The magnitude of the reduction in risk for the control is quantitatively greater in the provision of VCO (88%) than TCA (80%)
8.	Virgin Coconut Oil Soap to Prevent Vaginal Candidiasis Infection [25] Zulliati, Nurul Hidayah, Dyan Fitri Nugraha (2021) Banjarmasin, indonesia	Laboratory Experimental Test	- the process of providing raw materials followed by the process of breeding the fungus candida albicans - Making Virgin Coconut Oil (VCO) from coconut as the main raw material, and making soap with VCO based ingredients - breeding of candida albicans with a sterile process for 1 week then followed by mixing VCO with various doses together with the fungus	- The graph of the average diameter of the inhibition zone or the activity of Candida albicans at various concentrations of 50%, 75% and 95% shows the same results where there is no inhibition zone diameter in VCO soap against the activity of Candida albicans. - VCO is effective in inhibiting the development of candida albican fungus in pure dosage form so that the value of lauric acid content in VCO is still pure and has not been dissolved in the basic ingredients for making soap.
9.	The Success of Using Virgin Coconut Oil Topically for the Prevention of Pressure Sores (Decubitus)[26] Dene Fries Sumah (2020) Maluku, indonesia	Quasi experiment with one group pretest – posttest design. The sample in this study were stroke patients, totaling 15 respondents	VCO and Standard Operating Procedures for the Use of Topical Drugs in collaboration with effluerage massage and changes in right-to-left tilt position every 2 hours	- the use of VCO on the average skin condition according to the assessment of skin tissue integrity was at the highest score, namely a score of 7/9 respondents (60%), followed by a score of 8/4 respondents (26.7%) and the lowest score was a score of 9/2 respondents. (13.3%). - the skin condition of the respondents experienced changes in temperature as much as 15/15 respondents with a score of 2, namely warm, skin sensation experienced by 8/15 respondents with a

				score of 2, namely itching, skin weakness experienced by 7/15 respondents with a score of 2, namely moist and skin color experienced by 3 respondents between 2 respondents with a score of 1 which is pale and 1 respondent with a score of 3 which is reddish - There is an effect of VCO topically on changes in skin tissue integrity of pressure sores (decubitus) in stroke patients as shown in the difference in score of 2.4 with p value = <0.05).
10.	Curcumin Enriched VCO Protects against 7,12- Dimethyl Benz[a] Anthracene-Induced Skin Papilloma in Mice[27] Arunaksharan Narayanankutty, Anusree Nair, Soorya Parathodi Illam, Aman Upaganlawar & Achuthan C. Raghavamenon (2020) India	Experimental design 48 male balb/c mice	- Normal control KI: Animals were fed with normal diet and water. - K control II: Carcinogen (DMBA) Rats from this group received regular food and water. - K III: VCO treatment group: animals received the same diet as DMBA control and additional pre-treatment with VCO at a dose of 8 mL/kg body weight, orally for 3 weeks. - K–IV: curcumin-treated group: Curcumin (1.32 mg/kg) was dissolved in peanut oil and administered to animals orally with a feeding needle for 3 weeks at the same duration as VCO treatment. - K-V: Low dose curcumin-fortified VCO treatment group (VCrL): Animals were treated with VCrL (4 mL/kg b. wt.) as an oral gavage for 3 weeks.	- Analysis of VCO and Curcumin Constituents on Intestinal Absorption and CYP Enzymes showed that curcumin and VCO constituent molecules, except quercetin, had higher intestinal permeability, as indicated by renal cell permeability and CaCO2- In Vitro assays. - Effect of Curcumin-Enriched VCO on Tumor Burden In the DMBA control group, the mean latency period was 12.6 weeks. It increased to 13.1 weeks with VCO treatment. In low and high doses - in the DMBA control group of animals (28.16 ± 1.75 nmol/mg protein) compared to normal animals fed the reference diet (17.58 ± 1.89 nmol/mg protein). In curcumin and VCO pretreatment, TBARS levels were reduced to 22.59 ± 2.24 ($p < 0.05$) ybg and 25.53 ± 2.14 ($p < 0.01$) nmol/mg protein. - Oral administration of VCO-enriched curcumin (VCr) efficiently reduced the incidence of skin papilloma in animals treated with DMBA/croton oil.

			- K–VI: High-dose curcumin-fortified (VCrH) VCO pretreated group: These animals were administered with VCrH (8 mL/kg b.wt.) orally gavage	- curcumin enriched virgin coconut oil is a new combination with increasing anticancer activity
11.	Antibacterial and immunomodulator activities of virgin coconut oil (VCO) against Staphylococcus aureus[28] Desy Cahya Widianingrum, Cuk Tri Noviandi, Siti Isrina Oktavia Salasia (2019) Kalimantan, indonesia	Laboratory experimental design using balb/c mice	- Staphylococcus aureus isolated from cross-bred goat milk (PE) subclinical mastitis and confirmed based on biochemical identification and genotype - Virgin coconut oil was evaluated at different concentration levels (0.50, 100.150, 200, 250, 300, 350, 400) - Mice were euthanized with pentobarbital 125 mg kg1 intravenously. The skin over the abdomen was cleansed, and 1 ml of Hanks Balanced Salt Solution (HBSS, Lonza, USA) was injected into the peritoneal cavity. This fluid contains macrophage cells. A total of 108 bacteria mL1 were suspended with macrophage cells and incubated for 1 hour at 37°C	- In vitro test confirmed the inhibitory effect of VCO on the growth of S. aureus at a concentration of 200 l (equivalent to 0.102 % LA). - The results of the phagocytic activity of mice peritoneal macrophages against S. aureus after treatment with VCO the number of S. aureus phagocytized in macrophage cells at every 50, 100, 150, 200 L of VCO was 24.7 14.14, 26.1 12.94, 42,7 18,31,49 bacterial cells, respectively. There is a significant ($P < 0.05$) - VCO can inhibit the growth of S. aureus by damaging the bacterial cell wall and increasing the phagocytic ability of immune cells.
12.	In vitro anti-inflammatory and skin protective properties of Virgin coconut oil[29] Sandeep R. Varma, Thiyagarajan O. Sivaprakasam, Ilavarasu Arumugam, N. Dilip, M. Raghuraman, K.B. Pavan, Mohammed Rafiq, Rangesh Paramesh(2019)	Pre-lab experiments using HaCaT (human keratinocytes), THP-1 (human monocytes) and NIH3T3 (rat embryonic fibroblasts)	- Composition of virgin coconut oil (VCO) was determined by: GC-FID analysis. A total of 8 fatty acids were qualitatively identified in the VCO against the standard FAME mixture - THP-1 and HaCaT cells were cultured in 96-well plates (1 104 cells/mL) and treated with various concentrations of (15.625e1000 mg/mL) VCO.	- Topical application of VCO exerts anti-inflammatory activity by inhibiting various levels of cytokines including TNF-a, IFNg, IL-6, IL-5 and IL-8 and improves skin barrier function by regulating the expression of AQP-3 mRNA, filaggrin and involucrin as well as by protects against UVB rays - VCO can be useful in treating skin disorders with permeability barrier dysfunction, especially those accompanied

	India		- cells were subjected to LPS (1 mg/mL) for cytokine secretion, followed by treatment with two concentrations of non-toxic VCO for cytokine suppression	by decreased epidermal protein expression, such as atopic dermatitis, eczema.
13.	Virgin coconut oil as prophylactic therapy against alcohol damage on skin in COVID times[30] Punit Saraogi MBBS, Vaibhav Kaushik BTech, Ritesh Chogale BTech, Sneha Chavan BTech,| Vaishali Gode PhD, Sudhakar Mhaskar PhD (2021) Mumbai, india	The home use study was conducted with 60 volunteers during the 15 days of the intervention—Control Group: 6 applications per day ABHS and Test Group: The use of VCO overnight (6–8 drops) followed by the use of ABHS 6× per day	- Phase I: Parameter Probe Testing was performed on 12 healthy volunteers (5 women, 7 men) selected in the 18-60 years age group. - Phase II: conducted with 60 volunteers (43% male, 57% female; All Asian) aged 18-60 years and 28 subjects in the VCO group completed the study period (2 dropouts) - Phase III: A mechanistic study was performed using the ATR-IR probe on 5 volunteers (3 males, 2 females; All Asians) aged 20–45 years with a (10 day intervention period)	- Alcohol exposure to the skin causes a weakening of the skin barrier structure of lipid bilayers providing evidence of alcohol compromising the integrity of the skin barrier - A significant reduction (−11.8%) in water content was observed in the group with only ABHS application while a significant positive shift (+15.4%) was noted for the group with overnight VCO application. - Day 1 of the VCO treatment regime showed benefit with a significant decrease in the percentage change for the lipid peak intensity but no significant reduction was observed for the protein peak. - On day 15 of VCO application, protective benefits were seen at the best level and no changes in lipid and protein peaks were observed before and after alcohol exposure.
14.	Empty nano and micro-structured lipid carriers of virgin coconut oil for skin moisturization[31] Norhayati Mohamed Noor, Abid Ali Khan, Rosnani Hasham, Ayesha Talib, Mohamad Roji Sarmidi1, Ramlan Aziz, Azila Abd Aziz. (2016)	research (experiments) carried out on animal skin using rat stomach skin samples	- prepared skins were equilibrated in PBS buffer at 4°C the day before the experiment. - ml samples were taken at 0, 0.5, 1, 2, 4, 8, 14, 20, 26, 32, 38, and 44 hours, each compensated by the addition of the equivalent volume of PBS buffer. - The collected samples were extracted with ethanol (99%) at a	- linear line starting from 0 o'clock to 2 o'clock. VCO-SLP particles spread faster at smaller particle sizes (Sample A) compared to larger sizes (Samples B and C) - sample A harbored more amount of ferulic acid in the skin than samples B and C with the smallest particle size (0.608 m). This verified that the VCO-SLP Sample with a size of 0.608 m retained on the skin, was

	Kuala lumpur, malaysia		ratio of 1:1 for 20 minutes in an ultrasonic bath - The rat skin was put into a glass bottle containing 2 ml of ethanol and vortexed for 10 minutes. The vial was placed in a sonication bath for 20 min for further extraction of VCO-SLP. Finally, the solution was filtered and injected into the HPLC.	most suitable for use as an occlusive material.
15.	Enhanced barrier functions and anti-inflammatory effect of cultured coconut extract on human skin[32] Soomin Kima, Ji Eun Janga , Jihee Kim M.D, Young In Lee M.D, Dong Won Lee M.D, Ph.D, Seung Yong Song M.D, Ph.D, Ju Hee Lee M.D,Ph.D (2017) Soul, korea	Experimental study using female skin specimens (age: 35-55 years)	- VCO and CCE (cultured coconut extract), which were provided as liquids, were added to the culture media and serially diluted with different concentrations. - Chemical structure of fatty acids in CCE. Human dermal fibroblast (HDF) cell survival - HaCaT cells - evaluated with the CCK-8 test kit.	- The CCE-treated group showed increased expression of cornified sheath components, which contribute to the protective barrier function of the stratum corneum. - expression of inflammatory markers was lower in the CCE-treated group after exposure to UV radiation and showed increased expression of collagen and hyaluronan synthase-3.
16	Enhancement of physicochemical properties of nanocolloidal carrier loaded with cyclosporine for topical treatment of psoriasis: in vitro diffusion and in vivo hydrating action[33] Siti Hajar Musa, Mahiran Basri1 Hamid Reza Fard Masoumi, Norashikin Shamsudin, Norazlinaliza Salim (2017)	In vivo experimental study of 15 healthy volunteers aged 20–35 years old (female) quarantined for 1 hour in standard temperature 25 ° C ± 1 ° C and relative humidity of the room 50% ± 3%.	- Cyclosporine (0.1%, w/w) added to NMO (15%, w/w) - Individual VCO - A mix of NMO and VCO.	- NMO is only 0.5% (w/w) and VCO is 1% (w/w) - The mixture of NMO and VCO showed excellent solubility of up to 1.5% (w/w) cyclosporine in 15% (w/w) total oil compared to the solubility of cyclosporine with individual oils. - The blended oil showed an increase in the solubility of cyclosporine, due to the higher content of fatty acids in the mixed solution compared to the fatty acid content in the individual oils, and thus able to solubilize more hydrophobic compounds.

	Serdang, malaysia			- Nanoemulsion with higher oil content can bring higher cyclosporine content at faster diffusion for mouse skin and synthetic membranes - higher oil content has a better effect on TEWL and skin moisture content.
17	Gellan Gum Hydrogels Filled Edible Oil Microemulsion for Biomedical Materials: Phase Diagram, Mechanical Behavior, and In Vivo Studies[34] Muhammad Zulhelmi Muktar, Muhammad Ameerul Amin Bakar, Khairul Anuar Mat Amin, Laili Che Rose, Wan Iryani Wan Ismail, Mohd Hasmizam Razali, Saiful Izwan Abd Razak and Marc in het Panhuis (2021) Terengganu, malaysia	In vivo Wound Healing Experiment, a total of 20 female Sprague–Dawley rats aged six weeks	- group (a)Option film dressing acting as positive control - group (b) Wounds treated with GG(gellan gum) dressing were considered as negative controls - group (c) was wrapped with hydrogel GG and GVCO 80, and was followed by a postoperative opsite waterproof film dressing (Smith and Nephew, Hull, UK) as a secondary dressing. The dressing is then held in place with gauze to provide mechanical protection to the dressing	- qualitative antibacterial in vitro GVCO hydrogel against Gram-negative (Escherichia coli and Klebsiella pneumoniae) and Gram-positive (Staphylococcus aureus and Bacillus subtilis) bacteria showed that VCO had a weak antibacterial effect. - in vivo in Sprague-Dawley rats showed the best wound contraction of GVCO80 hydrogel (95 + 2%) after day 14 compared to Smith & NephewOption post-op waterproof dressing of 93 + 4% - GVCO hydrogel has the potential to be used as a wound dressing material

Table 2. Summary of articles on chicken oil research results

no	Article title/ author/ year/ location	Research method/population	Intervention	Research result
1	Differences in the dosage of 5%, 10% and 15% of broiler chicken claw bone collagen gel on wound healing time in rabbits [35] Eva diatri atiningsih, wilda amananti, joko santoso (2021)	Experimental research, using chicken claw bone collagen, with a sample of 5 rabbits	- collagen dosage gel 5% - collagen dosage gel 10% - collagen dosage gel 15% - positive control (pure gelatin) - negative control (without treatment)	- in formula I with a dose of 5% gives the fastest healing effect, which is for 14 days - Formula II with a dose of 10% and formula III with a dose of 15% provides a healing effect for 21 days
	Tegal, indonesia			- The wound healing process that is smeared with gelatin can also promote wound closure and can also increase granulation
2	Test of Healing Effects of Chicken Fat Oil (Gallus Domesticus) Against Cuts in Rabbits (Oryctolagus Cuniculus)[36] Agus ryanto (2017) Makassar, indonesia	laboratory experimental research, Samples used chicken and rabbit fat oil which were given an incision (incision wound)	- K I was given traditional chicken fat oil of 25%, 30%, 35%, 100% in 3 incisions as much as 1 spread. Given once every 24 hours. - K II was given chemical chicken fat oil 25%, 30%, 35%, 100% in 3 incisions as much as 1 spread. Given once every 24 hours. - K III was given a positive control of Povidon Iodin® and a negative control of liquid paraffin. Administered once every 24 hours. - KIV negative control without treatment	- The best wound healing effect was given by chemical chicken fat oil with a concentration of 35%, this was marked by 100% healing (wound closure) occurring on the 16th, 17th, and 16th days. - traditional chicken fat oil with a concentration of 35%, this was marked by 100% healing (wound closure) occurring on the 17th, 16th, and 17th days. - For positive control, povidone iodine occurred on the 17th, 16th, and 17th days - for negative control, wound healing occurred on day 25, 24 and 25
3	Effect of Giving Broiler Chicken Eggs on Healing of Perineal Wounds in Postpartum Mothers [37] Ratna dewi (2019) Aceh, indonesia	quantitative research that uses the types of Quasi Experimental, the number of samples is 30 postpartum mothers	- The intervention group was postpartum mothers with perineal rupture who were given boiled eggs of 3-5 broiler chickens. - the control group, namely postpartum mothers who did not receive any treatment	- 15 postpartum mothers measured in the treatment group (given boiled eggs) 6 of them recovered within 6 days, and 3 others recovered within 5 days - 15 postpartum mothers in the control group recovered 7 people recovered within 12 days, only 2 people recovered within 10 days.
4	Utilization of Broiler Chicken Skin Waste as Raw Material for Making Biodiesel [38]	Experimental research using broiler chicken skin, distilled water, KOH and methanol	- Extraction of fat from broiler chicken skin - Determination of Broiler Skin Fat Moisture Content	- The water content contained in broiler skin oil is less than 1% so there is no need for any treatment to remove the moisture content

	Isalmi Aziz, Siti Nurbayti, Lutfi Arsam Dalili (2014) Bandung, indonesia		- Determination of Free Fatty Acids (FFA) Broiler Skin Fat - Biodiesel Production	- The largest chemical compounds are methyl oleate (34.60%) and methyl palmitate (17.16%). - The optimum conditions for making biodiesel from broiler chicken skin waste can be obtained at: time of 60 minutes, temperature of 60oC and 1% KOH catalyst concentration with 88% yield.
5	Physico-chemical composition, fractionated glycerides and fatty acid profile of chicken skin fat[39] Vivian Feddern, Larine Kupski, Eliane P. Cipolatti, Gregory Giacobbo, Gabriela L. Mendes, Eliana Badiale-Furlong and Leonor A. de Souza-Soares (2010) Brazil	Research method survey soybean oil, and chicken skin	evaluated the physico-chemical composition and fatty acid profile and fractionated glycerides of chicken skin fat compared to oil (soybean) in interesterification reactions.	- The use of chicken skin fat showed a low level of lipid oxidation (PV 2.14 meq/kg, p-anisidin 0.70 absorbance unit) and a high amount of unsaturated fatty acids as oleic (34.8%) and linoleic (28.3 %) - Long-chain saturated fatty acids as palmitic (23.5%), the most abundant, can be replaced by other types of fatty acids so that chicken skin fat is suitable for different applications such as production of functional lipids by interesterification or biodiesel. - The use of chicken skin fat can help minimize the deposition of residues in the environment
6	Rheological and functional characterization of gelatin and fat extracted from chicken skin for application in food technology[40]	Experimental research design, Samples used chicken skin and beef gelatin	simultaneous extraction of gelatin and fat from chicken skin waste	- The highest content of fatty acid in chicken skin is oleic acid (42.13%), which makes chicken skin fat a good source of monounsaturated fatty acids. - Chicken skin gelatin showed higher viscosity, foam capacity, bloom value, and storage modulus than commercial beef
	Sedigheh Mohammadnezhad, Jamshid Farmani (2021) Sari, iran			gelatin. Chicken skin fat contains oleic and palmitic acids. 1.5218:2 n−617. 5 3± 0.3618:3 n−30.96± 0.0320:1 n−90.42± 0.04SFA31
7	Bioactive Fatty Acids in the Resolution of Chronic Inflammation in Skin Wounds[41] Carlos Poblete Jara, Nata´lia Ferreira Mendes,Thais Paulino do Prado, Eliana Pereira de Arau´ jo (2019) Campinas, brazil	clinical trials and basic research studies with 35 original articles selected for review	- Inflammatory response and involvement of fatty acids in wound healing skin were assessed - main effects of fatty acid treatment, including various cellular features for healing, specific activation of fatty acid receptors, their inflammatory and immune functions in the skin, as well as their possible application in clinical practice	- use of bioactive lipids in clinical practice can improve wound care - Unsaturated fatty acids have emerged as potential therapeutic targets in the wound care field. Oleic (x-9), linoleic (x-6), and a-linolenic (x-3) acids, as well as bioactive products, were the most commonly tested fatty acids in wound skin, demonstrating an effective role in accelerating wound closure.
8	Isosorbide di-(linoleate/oleate) stimulates pro-differentiation gene expression to restore the epidermal barrier and improve skin hydration[42] Krzysztof Bojanowski, William R. Swindell, Shyla Cantor, Ratan K. Chaudhuri (2020) USA	double-blind placebo-controlled trial, human subjects with a sample of 17 women with xerotic skin problems	- left arm is used for - IDL lotion - right arm was used for placebo CTL lotion for 5 days	- IDL was more effective in increasing the expression of genes related to lipid homeostasis, KC differentiation, and epidermal barrier function. Although inflammatory gene expression was suppressed by both treatments, this effect was stronger with IDL, which decreased expression of a gene associated with T cell activation, an unhealthy skin marker gene. - the efficacy of IDL as a unique treatment option with multiple mechanisms of action. combines anti-inflammatory effects such as corticosteroids with altered bioactivity that promotes KC differentiation to restore skin barrier function

Discussion

The purpose of this article is to present up-to-date information and a comprehensive review of the existing literature on the benefits of Post Sectio Caesarea Wound Infection Prevention. The findings of this scoping review provide some credence for previous literature studies, which described chicken fat oil and VCO as one of the biomarkers that can be used as complementary topical therapy in wounds. In total, we included 25 peer-reviewed articles that met the inclusion criteria.

risk factors for complications of sectio caesarea wound, including obesity, smoking, diabetes, chorioamnionitis, surgical experience, and skin incision type were not significant[43]. If the cause of the wound is not considered, it will cause infection in the abdominal suture wound\

Benefits of VCO on wounds

in the study (mifta, et all., 2021) respondents performed perineal wound care using virgin coconut oil every 3 times a day while bathing using sterile gauze given virgin coconut oil and smeared on the wound acceleration using virgin coconut oil as much as 5 respondents with a faster healing time of perineal wounds 7 days, 3 respondents with a healing time of 5 days and 2 respondents with a healing time of 4 days with a percentage of 100% which is categorized as faster healing. VCO contains many benefits to help wound healing, supported by the theory of Chew (2019), pure coconut oil with the main content of lauric acid which has antibiotic, anti-bacterial, anti-fungal and anti-viral properties. The body processes lauric acid into monolaurin which is responsible for destroying viruses, and bacteria such as Streptococcus bacteria, Staphylococcus aureus which is very dangerous, and the fungus Candida Albicans which is very common to cause infections in humans. So if it is applied to the wound it will heal on the 4-5th day[44].

In vitro studies have proven that VCO has antibacterial activity against Staphylococcus aureus. Virgin coconut oil has been shown to be comparable to mineral oil as an emollient which is an occlusive ingredient that helps skin hydration by sealing the skin's surface and retaining water in the stratum corneum.[45]

We know cases of wounds that often occur in the obstetric area, including episiotomy wounds, sectio caesarea surgical wounds, abdominal surgical wounds due to gynecological cases, or wounds due to complications of the delivery process.[46]. Infection in the caesarean section wound is one of the causes of infection during the puerperium which can contribute to the Maternal Mortality Rate (MMR), if not noticed, the cause of infection during the puerperium is caused by bacteria. Skin flora such as Streptococcus, Staphylococcus, and other bacteria that can cause puerperal infections[46]

Our findings show, in some surgical cases, that the addition of VCO to MHA can inhibit the growth of S. aureus. The mechanism of killing or inhibiting organisms has many variable aspects and complete processes. (Desy Cahya, et.all reported

Staphylococcus aureus isolated from subclinical mastitis of Etawa Peranakan milk (PE) and virgin coconut oil at different concentrations showed that VCO could inhibit the growth of S. aureus in agar dilution media with a concentration of at least 200 (equal to 0.102% LA) medium[28]

To prevent infection in wounds, wound care can be carried out using virgin coconut oil (VCO). The results of the study (mifta, et all., 2021) found the effect of giving virgin coconut oil to accelerate the healing process of perineal wounds in post partum mothers with p value = 0.004 < = 0.05, with the mean value using VCO = 1.166 and the mean value not using VCO = 2.00. Surgical site infections are a risk for every surgical patient and lead to negative outcomes for patients and health care institutions. Both modifiable and nonmodifiable patient factors and preoperative, intraoperative, and postoperative procedural factors influence the development of surgical site infection.47. This is in accordance with research (Tirta et al., 2015) proving that topical VCO therapy showed a significant antibacterial effect on wounds infected with MRSA bacteria.[21].

The main component of VCO is 60% lauric acid [18]. In the human body lauric acid is converted into a form of monoglyceride compounds, namely monolaurin. Monolaurin is a compound that has antiviral, antibacterial, and antifungal properties [48] It is also antimicrobial that softens the skin. Besides that, VCO is effective and safe to use as a moisturizer to increase skin hydration and accelerate wound healing.[49]. The content of omega-3 acids and antioxidants in coconut oil has been shown to be very effective in moisturizing the skin, so it can help prevent keloid scarring and also repair the skin[50]. This research is in line with (Norhayati et al., 2015) revealing that VCO-SLP is solid and round in shape. Ultrasonication was carried out at several power intensities which resulted in VCO-SLP particle sizes ranging from 0.608 ± 0.002 m to 44,265 ± 1.870 m. so that VCO has the potential to be used as micro/nano-scale cosmetics to moisturize the skint[31]

Benefits of chicken fat oil on wounds

The role of essential fatty acids in wound healing is unclear, but because they are involved in the synthesis of new cells, insufficient supply of these essential fatty acids will inevitably delay wound healing. It is debatable whether polyunsaturated omega-3 fatty acids (PUFA) are more beneficial than omega-6 PUFAs. Omega-3s are anti-inflammatory, which aid in wound healing, but can inhibit unfavorable clotting[51]

Several studies have explored cellular mechanisms involving intracellular signaling activated by fatty acid receptors during skin wound healing. However, most of these experimental studies have not provided a precise description of how activation of classical signaling pathways involving lipids and their bioactive products can modulate intracellular signaling. To clarify this subject, we looked for multiple intracellular signaling pathways involving fatty acid receptors in the skin[41]

Nutritional deficiencies impact wound healing by inhibiting fibroblast proliferation, collagen synthesis, and epithelialization, among other important

functions. In this way, the correct nutritional support of bioactive lipids and other essential nutrients plays an important role in the outcome of the wound healing process[41]. Chicken fat is used as a source of oil because it has a fairly high oil content of about 33.5%. The four largest fatty acids that make up chicken fat are oleic acid (38.35%), palmitic acid (27.24%), linoleic acid (16.36%) and palmitoleic acid (7.01%)52. Oleic acid is an essential fatty acid which is the precursor of a group of eicosanoids that are similar to the hormones prostaglandin, prostacyclin, thromboxane and leukotrienes.[53].

In addition to oil produced from chicken fat, it turns out that chicken eggs also have a role in perineal wound healing, protein and essential amino acids. Research (Ratna Dewi, 2019) also obtained statistical analysis results at a significance level of 95%, using the Mann-Hitney test, the results obtained were p= 0.000. This indicates that there is a significant difference ($p < 0.05$) in the duration of perineal wound healing with the consumption of boiled eggs and without the consumption of boiled eggs in postpartum mothers in the District of Want Jaya. Based on the 15 postpartum mothers measured in the treatment group (given boiled eggs) 6 of them recovered within 6 days, and 3 others recovered within 5 days. Protein from eggs is needed as a building material that forms body muscle tissue and accelerates the recovery of suture wounds in the perineum or in the birth canal.[37]

Another study (Eve Diatri, et al. 2021) made a dose of collagen gel on the bones of broiler chicken feet, which was a previous in vitro study from cows. Chicken feet consist of skin, bone, muscle, and collagen. The collagen content in broiler chicken feet is about 12.08 %8. Researchers used collagen from broiler chicken claws to speed up burn healing because there was more collagen in broiler claws than native chicken feet. Gelatin is obtained through the extraction and hydrolysis of water-insoluble collagen. The gel is soothing. moisturizing, and easily penetrates the skin to provide a healing effect. A dose of 5% collagen can heal wounds in 14 days compared to 10% and 15% collagen formulas for 21 days[35].

Several studies have revealed the potential role of lipids as a treatment for skin wound healing. Unsaturated fatty acids such as linoleic acid, a-linolenic acid, oleic acid, and their other bioactive products have shown an effective role as a topical treatment of chronic skin wounds. The effect, when treatment was started on day 0, has been observed mainly in the inflammatory phase of the wound healing process.

Research (Jara et al., 2020) states that chicken fat has a high content of linoleic acid (omega-6 fatty acid) with a percentage of 7.9-22.8%. In addition, it can be seen that linoleic acid in GCMS results has a percentage of about 15% and is one of the dominant fatty acids in chicken fat54. These compounds play an important role in fat transport and metabolism, immune function, maintain cell membrane integrity and function as a natural anti-bacterial and are the most commonly tested fatty acids in skin wounds, showing an effective role in accelerating wound closure[55]. This is supported by Agus Ryanto's research (2017) in his research that chicken fat oil (Gallus domesticus) has activity in healing cuts in rabbits (Oryctolagus cuniculus) and the optimum wound healing effect is provided by

chicken fat oil (Gallus domesticus) of 35%. and gives wound healing almost on par with Povidon Iodin[36]

Conclusion

Based on a review of research from several journals published previously, VCO has been used for the treatment of wounds as well as chicken fat oil but it is still lacking. Liniment can offer wound care with complementary products. VCO can accelerate the healing of perineal wounds, full thickness skin graft wounds, diabetic ulcers, decubitus wounds, but prophylaxis, psoriasis treatment, increasing the number of fibroblasts, has an ameliorative effect on heterophils, prevention of intraperitoneal adhesions, prevention of vaginal candidiasis infection, as anti-cancer activity, antibacterial and immunomodulatory, anti-inflammatory, moisturizing. chicken fat can accelerate wound healing in rabbits, test the effectiveness of rabbit cuts, as a raw material for biodiesel production, look at the fatty acid profile, heal chronic inflammation in skin wounds, and increase skin hydration.

Thus the author can provide an overview in general and specifically regarding the benefits of VCO and chicken fat oil as an innovation to prevent post-section caesarean wound infection.

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