

Development of an Ointment to Medicate Medicine for Dosage Caused by Mucus in Babies with the Active Compound Sotong (*Sepia sp.*) and Essential Oils *Cymbopogon citratus*

Aliefman Hakim^{1*}, Burhanuddin¹, Jeckson Siahaan¹, Jono Irawan¹, Zelisa Nudia Fitri²

¹Chemistry Education Department, University of Mataram, Mataram, Indonesia

²Master of Science Education, Postgraduate University of Mataram, Mataram, Indonesia

*E-mail: alief27@gmail.com

Received: September 2, 2024. Accepted: November 20, 2024. Published: November 30, 2024

Abstract: Sumbawa society is rich in culture, especially in traditional medicine. People use materials from the surrounding environment, including plants and animals, as active ingredients for medicine. Newborn babies and toddlers are susceptible to blockage of the respiratory tract with mucus. In babies, it is usually caused by an imperfect suction process, while in toddlers, it is caused by bacteria or viruses. The Samawa people use a mixture of cuttlefish (*Sepia sp.*) and eucalyptus oil as a medicine that effectively removes mucus from the body. The active ingredient in cuttlefish has an unpleasant odour and cannot be stored for long. When they need cuttlefish, people must look for them in markets or traders on the coast. Of course, this takes time to use. The ointment production innovation has many advantages, including practicality, no fishy smell, ease of obtaining, and ease of storage for the long term. Using the natural active ingredient lemongrass, essential oil adds aromatherapy and provides warmth to the chests of babies and toddlers. Natural active and gel-based ingredients are safe to use without side effects. The ointment was tested for active ingredient content using GCMS and organoleptic tests for gel stability, spreadability (homogeneity), pH, and skin irritation. Based on the description above, it can be concluded that the ointment product is made from an anti-skin irritation gel base, pH 7, and gel spreadability of 5.5 cm. The active substance comes from cuttlefish *Sepia sp.* by inhibiting the COX-2 enzyme and reducing the production of prostaglandin E2 (PGE2), an essential inflammatory mediator in the pathogenesis of asthma and bronchitis. The simple production process means that the price of the ointment is within people's purchasing power.

Keywords: Anti-Stuffing, Baby; *Cymbopogon citratus*; Ointment; *Sepia sp.*

Introduction

Education in Indonesia is encouraged to foster education that supports sustainable development goals (SDGs) in industrial innovation, health, and welfare (*Industry, Innovation, Good Health, and Well-being*). Production development in a healthy society starts by looking at the natural potential around the community. Moreover, people have many cultures in traditional medicine. Ancestral culture in medicine is not based on medical results but on objective evidence in its application, which is believed to be effective in treating disease. Traditional medicine uses natural resources, both vegetable and animal. Active ingredients from plants are widely used in almost all circles of society in Indonesia. It differs from treating shortness of breath (whistling breath) in babies and toddlers. People use cuttlefish (*Sepia sp.*) and eucalyptus oil as a medicine to expel phlegm or mucus.

Traditional medicine generally uses fresh ingredients in its application. Fresh ingredients are perishable and depend on availability in the surrounding environment. Cuttlefish (*Sepia sp.*) is a living ingredient that the public can consume. In long storage, cuttlefish have an unpleasant odour. People use mucus on the back of cuttlefish, which is believed to be able to remove

mucus from the baby's respiratory tract. The active ingredient in cuttlefish mucus is obtained through a conventional process, namely by scraping it directly. Mucus cannot be stored for a long time. Cuttlefish mixture in traditional medicine uses eucalyptus oil. This oil has a strong odour and is sensitive to the baby's skin, so that it can cause skin irritation.

Sepia sp. is a genus of cuttlefish in the family *Sepiidae*, the most known in the community, commonly called squid. Octopus (*Sepia sp.*) has the potential as an anti-inflammatory in people living with asthma with the content of several compounds that can act as anti-inflammatories, such as steroids, triterpenoids, alkaloids, tannins, and glycosides [1-3]. Cuttlefish can function as an antimicrobial with an inhibitory power of 31 ± 1.2 mm at a concentration of 350 ppm [4].

The traditional medicine of Cuttlefish and Eucalyptus Oil has been used for generations by the Samawa people. It is believed to be effective in removing mucus from the bodies of babies or toddlers. Newborn babies often experience mucus, which disrupts the respiratory system. The mucus causes a whistling sound in the baby's breath. The incomplete respiratory cavity is disturbed by mucus, causing shortness of breath. This condition is quite disturbing for parents. The existence of cuttlefish in critical situations is an active

How to Cite:

Hakim, A., Burhanuddin, B., Siahaan, J., Irawan, J., & Fitri, Z. N. (2024). Development of an Ointment to Medicate Medicine for Dosage Caused by Mucus in Babies with the Active Compound Sotong (*Sepia sp.*) and Essential Oils *Cymbopogon citratus*. *Jurnal Pijar Mipa*, 19(6), 1063-1066. <https://doi.org/10.29303/jpm.v19i6.6445>

ingredient in traditional medicine. Cuttlefish extract will be combined with lemongrass essential oil with aromatherapy activity as an ointment that is easy to use and without side effects. Lemongrass essential oil has many benefits, including antibacterial [5], antiviral [6], antifungal, anxiolytic [7], and therapeutic [8]. The active compounds that play a role in lemongrass are citral, β myrcene, limonene, linalool, geranyl acetate, saponin, neryl acetate, and tannin [8].

The development of ointment products makes it easier for people to use and store for a long time. Society can provide it without obstacles, and be used when needed. The use of natural active ingredients and safe essential ingredients does not cause side effects in long-term use.

Research Methods

Cuttlefish (*Sepia* sp.) and essential oils are isolated from natural ingredients using safe and practical methods. Cuttlefish extract and essential oils are combined as active ingredients and aromatherapy. The active ingredients are emulsified in a secure base gel. The process of making ointment can be seen in the following material.

Experts from the Chemistry Laboratory of FKIP, Mataram University, designed the equipment. All parts of the insulation equipment use rust-resistant materials. Basic equipment materials are necessary to maintain the quality of the essential oil produced. Pure lemongrass essential oil is tested for active compound content using the Gas Chromatography-Mass Spectrometry (GC-MS) method. Essential oils were also tested for phytochemicals at the FKIP chemistry laboratory at Mataram University. Phytochemical tests were carried out to confirm the presence of active compounds that were not detected by the GC-MS method. The content of active compounds is a priority for the products produced.

Results And Discussion

Lotion Basic Ingredient Formulation

The essential ingredients for making lotion are selected effectively by national standards (SNI), and they are safe for use on the skin of babies and toddlers. The gel uses Shea Butter and gel from natural bee oil (beeswax). These ingredients are classified as safe for baby's skin and do not cause side effects.

Lotions made using shea butter and beeswax have received significant attention in the cosmetics industry, especially in developing safe skin care products for babies. Shea butter is a natural fat obtained from the seeds of the shea tree (*Vitellaria paradoxa*), known for its high content of fatty acids and vitamins, such as stearic and linoleic acids, as well as vitamins E and A. The benefits of shea butter for baby skin include anti-inflammatory properties, moisturizing, and wound healing, which makes it an ideal ingredient in gentle, non-irritating skin care products [9]. Beeswax, or beeswax, is another natural ingredient often used in baby lotion formulations. Beeswax has emollient and protective properties, creating a protective layer on the

skin that prevents moisture loss without blocking pores [10]. Combining shea butter and beeswax in baby lotion produces a product that effectively maintains skin moisture, reduces irritation, and protects sensitive baby skin from harmful environmental factors [11].

Various scientific studies have supported the safety and effectiveness of shea butter and beeswax in baby skin care products. Shea butter has hypoallergenic properties and is suitable for all skin types, including babies' sensitive skin [12]. Beeswax not only acts as a physical barrier that protects the skin but also has natural antibacterial properties that can prevent minor skin infections [10]. Additionally, the combination of these two ingredients in lotions has been found to increase the moisture and elasticity of infant skin without irritating [11]. Thus, lotion formulations using shea butter and beeswax offer a safe and natural solution for baby skin care, supporting healthy skin function and protecting against environmental irritants [13].

pH and Irritant Effects on Skin

Shea butter and beeswax are natural ingredients often used in skin care products because of their safe and gentle properties, especially in maintaining a balanced skin pH and preventing irritation. Shea butter has a natural pH close to the pH of human skin, which is around 5-7, which helps maintain the skin's acid-base balance and prevents disorders such as dermatitis and eczema [14]. In addition, the essential fatty acids and vitamins in shea butter play an important role in skin cell regeneration and inflammation reduction, making it an ideal ingredient for sensitive skin [15]. On the other hand, beeswax also has a skin-friendly pH. It is known for its non-comedogenic properties and ability to create a protective layer on the skin without clogging pores, thereby reducing the risk of skin irritation and infection [16]. Beeswax contains natural antibacterial compounds that help keep the skin clean and free from infection-causing bacteria [17]. Combining shea butter and beeswax in skin care product formulations significantly reduces the risk of irritation and increases skin moisture, thanks to the synergy between the emollient and protective properties of the two ingredients [18]. Thus, using shea butter and beeswax helps maintain the skin's pH balance and minimizes the risk of irritation, making it a safe choice for caring for sensitive skin, including baby skin.

Gel Spreadability

The spreadability of gels that use shea butter and beeswax as essential ingredients is vital in ensuring the effectiveness and comfort of skin care products. The optimal formulation ensures that the active ingredients are evenly distributed over the skin surface. Shea butter has a thick fat consistency and can provide a rich texture but is still easily absorbed if combined with the correct emulsifier [19]. Beeswax, with its viscoelastic properties, provides a denser texture to the gel that requires adjustments in proportion to achieve a good balance between softness and efficient spreading [20].

Using a combination of carrier oils, such as jojoba oil or olive oil, could increase the spreadability of shea butter and beeswax-based gel formulations [21]. This oil helps reduce the total viscosity of the gel, making it easier to apply and evenly distribute on the skin surface. In addition, the pH of the gel is balanced according to the natural pH of the skin (around 4.5-6.5), which also contributes to increasing spreadability without irritating [22].

Adding humectants such as glycerin or propylene glycol in gel formulations can help retain moisture while increasing spreadability [23]. This humectant attracts moisture from the surrounding environment, so the skin remains hydrated, and the gel is more accessible to apply. Combining shea butter, beeswax, carrier oil, and humectant produces an optimal spread value, around 5.5-6.5 cm, ensuring the product is spread evenly and provides maximum protection and hydration without irritating [24].

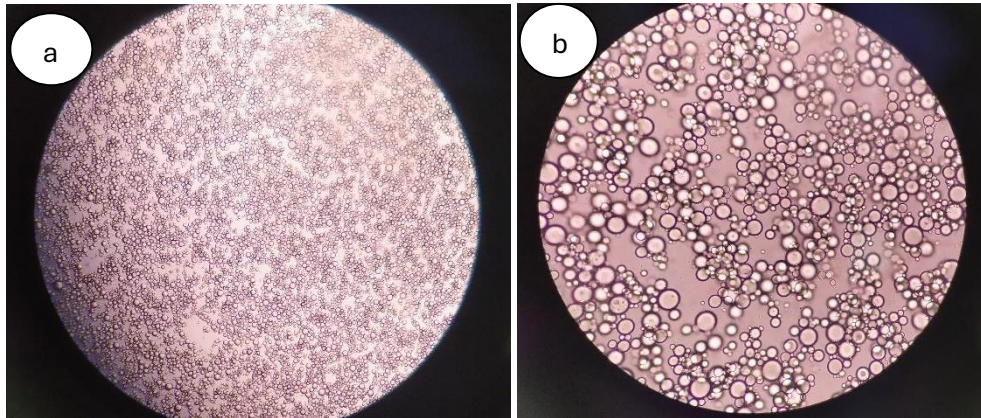


Figure 1. Visualization of cuttlefish ointment gel (a) 100x magnification (b) 400x magnification

Substance Activity on Cuttlefish Backs (*Sepia, sp.*)

Substances found in the backs of cuttlefish (*Sepia sp.*) have shown potential in treating shortness of breath through various pharmacological mechanisms. One of the main components contained in the back of cuttlefish is calcium carbonate (CaCO_3), which is known as a "sepia shell" or "cuttlebone." Calcium extract from cuttlefish backs has anti-inflammatory properties that can help reduce respiratory tract inflammation [25]. This extract works by inhibiting the COX-2 enzyme and reducing the production of prostaglandin E2 (PGE2), an essential inflammatory mediator in the pathogenesis of asthma and bronchitis.

Additionally, bioactive substances in cuttlefish dorsal, such as bioactive peptides, have significant bronchodilator effects [26]. This peptide works by relaxing smooth muscles in the respiratory tract through modulating calcium and potassium pathways, which reduces bronchial spasms and increases airflow. Calcium supplementation from cuttlefish backs improved bone health and benefited lung function, especially in patients with chronic obstructive pulmonary disease (COPD) [27]. This substance helps reduce oxidative stress in lung tissue, often triggering worsening symptoms of shortness of breath. Thus, the bioactive components extracted from cuttlefish backs show great potential in alternative therapy for respiratory conditions, supporting better lung function and significantly reducing the symptoms of shortness of breath.

Conclusion

Product development to make it easier for people to obtain and apply traditional medicines in their daily lives. Based on the description above, it can be

concluded that the ointment product is made from an anti-skin irritation gel base, pH 7, and gel spreadability of 5.5 cm. The active substance comes from cuttlefish *Sepia sp.* by inhibiting the COX-2 enzyme and reducing the production of prostaglandin E2 (PGE2), an essential inflammatory mediator in the pathogenesis of asthma and bronchitis.

References

- [1] Amir, N., Ananda, D., Elvianti, N., Studi Pemanfaatan Sumberdaya Perikanan, P., & Ilmu Kelautan dan Perikanan, F. (n.d.). Potensi Cangkang Sotong (*Sepia sp.*) Sebagai Antiinflamasi Pada Penderita Penyakit Asma Cuttlefish (*Sepia Sp.*) Shell As A Potential Source Of Antiinflammation For Asthma Patients. *Jurnal IPTEKS PSP*, 6(12), 207–213.
- [2] Mohanraju, R., Babji Marri, D., Karthick, P., Narayana, S., Narayana Murthy, K., & Ramesh, C. (n.d.). *Antibacterial Activity of Certain Cephalopods from Andamans, INDIA*.
- [3] Ramasamy, P., Subhapradha, N., Srinivasan, A., Shanmugam, V., Krishnamoorthy, J., & Shanmugam, A. (2011). In vitro evaluation of antimicrobial activity of methanolic extract from selected species of Cephalopods on clinical isolates. *African Journal of Microbiology Research*, 5(23), 3884–3889.
- [4] Adharyan Islamy, R. (2019). Antibacterial Activity of Cuttlefish *Sepia sp.* (Cephalopoda,) Ink Extract Against *Aeromonas hydrophila*. *Majalah Obat Tradisional*, 24(3), 184–188.
- [5] Subramaniam, G., Yew, X. Y., & Sivasamugham, L. A. (2020). Antibacterial activity of *Cymbopogon citratus* against clinically important bacteria. *South*

- African Journal of Chemical Engineering*, 34, 26–30.
- [6] Dev Sharma, A., Kaur, I., & Journal, A. (n.d.). *Arabian Journal of Medicinal & Aromatic Plants GC-FID based aromatic profiling and molecular docking studies Cymbopogon citratus L. GC-FID based aromatic profiling and molecular docking studies of lemon grass (Cymbopogon citratus L.) essential oil as novel therapeutic for SARS-Cov2 spike protein.*
- [7] Mendes Hacke, A. C., Miyoshi, E., Marques, J. A., & Pereira, R. P. (2020). Anxiolytic properties of *Cymbopogon citratus* (DC.) stapf extract, essential oil and its constituents in zebrafish (*Danio rerio*). *Journal of Ethnopharmacology*, 260.
- [8] Machraoui, M., Kthiri, Z., Jabeur, M. Ben, & Hamada, W. (n.d.). *Journal of new sciences. Agriculture and Biotechnology*, 55(5), 3642–3652.
- [9] Singh, M., & Singh, A. (2018). Review of the Properties and Applications of Shea Butter in Cosmetics. *International Journal of Cosmetic Science*, 40(1), 105-114.
- [10] Dweck, A. C. (2005). Beeswax: A Versatile and Natural Cosmetic Ingredient. *International Journal of Cosmetic Science*, 27(5), 283-292.
- [11] Vermaak, I., Kamatou, G. P. P., Komane-Mofokeng, B., Viljoen, A. M., & Beckett, K. (2011). African Seed Oils of Commercial Importance: *Cosmetic Applications. South African Journal of Botany*, 77(4), 920-933.
- [12] Tetteh, W., Osei, Y. D., & Fosu, P. (2017). Hypoallergenic Properties of Shea Butter in Dermatological Applications. *Journal of Dermatological Treatment*, 28(3), 265-272.
- [13] Kumar, N., & Singh, R. (2020). Beeswax: Quality Assessment and Applications in Skin Care. *Journal of Applied Cosmetology*, 38(2), 155-165.
- [14] Alander, J., Andersson, A. C., & Blomquist, G. (2010). Shea Butter: Properties and Applications in Cosmetics. *Journal of Cosmetic Science*, 61(1), 45-52.
- [15] Vaughn, A. R., Clark, A. K., & Sivamani, R. K. (2011). Natural Oils for Skin-Barrier Repair: Ancient Compounds Now Backed by Modern Science. *Journal of Clinical and Aesthetic Dermatology*, 4(11), 26-32.
- [16] Koller, D. Y., Halmerbauer, G., Böck, A., & Engstler, G. (2015). Beeswax in Skin Care: Benefits and Clinical Applications. *Pediatric Dermatology*, 32(5), 647-652.
- [17] Demirkesen, C., Önder, M., Tursen, U., & Lebe, B. (2007). The Effect of Beeswax on Bacterial Growth and Skin Protection. *Journal of the European Academy of Dermatology and Venereology*, 21(6), 808-813.
- [18] Blomfield, J., Kamatou, G. P. P., Vermaak, I., Viljoen, A. M., & Beckett, K. (2016). Synergistic Effects of Shea Butter and Beeswax in Skin Care Formulations. *Journal of Ethnopharmacology*, 192, 305-312.
- [19] Alander, J., Andersson, A. C., & Blomquist, G. (2004). Shea Butter: Properties and Applications in Cosmetics. *Journal of Cosmetic Science*, 55(3), 231-238.
- [20] Peterson, A., Bohannon, M., & Needham, D. (2013). Beeswax: An Effective Natural Emollient. *International Journal of Cosmetic Science*, 35(4), 304-310.
- [21] Funke, A., Berg, S., & Melzig, M. F. (2008). Jojoba Oil and Its Effects on Skin Hydration and Barrier Function. *Journal of Ethnopharmacology*, 116(2), 170-177.
- [22] Martins, D. B., Silva, E. J., & Cavalcante, C. S. (2014). The Role of pH in Skin Care Products: An Overview. *Journal of Dermatological Treatment*, 25(1), 3-7.
- [23] Mitura, S., Ratajezak, M., & Dąbrowski, J. R. (2011). The Influence of Glycerin on the Daya Sebar and Moisturizing Properties of Cosmetic Gels. *Journal of Cosmetic and Laser Therapy*, 13(1), 15-20.
- [24] Ray, S., Thakur, R. S., & Sinha, R. (2015). Enhancing the Spreadability and Efficacy of Topical Applications through Optimized Formulation. *Journal of Pharmaceutical Sciences*, 104(2), 426-432.
- [25] Zhang, L., Zhao, Y., & Wang, L. (2014). Anti-inflammatory Effects of Calcium Extracts from Sepia Shell in Airway Inflammation. *Marine Drugs*, 12(6), 3680-3691.
- [26] Chen, J., Li, X., & Zhou, X. (2015). Bronchodilator Effects of Bioactive Peptides from Sepia Shell in Asthma Management. *Journal of Ethnopharmacology*, 165, 69-76.
- [27] Lee, Y. H., Kim, S. H., & Choi, J. K. (2017). Calcium Supplements from Cuttlebone: Effects on Bone and Lung Health in COPD Patients. *Respiratory Medicine*, 123, 12-19.