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Traditional treatments for treating *lengkauk* disease employed by the community in the Segedong Sub-district, Mempawah District, West Kalimantan Province, Indonesia

RUQIAH GANDA PUTRI PANJAITAN[1,♥], DESTI RAHMADANI[1], HAYATUL FAJRI[1], DIAN AKBARINI[2], ZHU CAIPING[3]

[1]Department of Biology Education, Faculty of Teacher Training and Education, Universitas Tanjungpura. Jl. Prof. Dr. H. Hadari Nawawi, Pontianak 78124, West Kalimantan, Indonesia. Tel.: +62-71-646994, ♥email: ruqiahgpp@fkip.untan.ac.id
[2]Department of Natural Resources Conservation, Faculty of Engineering and Science, Universitas Muhammadiyah Bangka Belitung. Jl. KH. A. Dahlan 33134, Bangka Belitung, Indonesia
[3]Guangxi University School of Liberal Arts. No. 100, East Daxue Rd, Xixiangtang District 530004, Nanning, Guangxi, China

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Abstract. *Panjaitan RGP, Rahmadani D, Fajri H, Akbarini D, Caiping Z. 2025. Traditional treatments for treating* lengkauk *disease employed by the community in the Segedong Sub-district, Mempawah District, West Kalimantan Province, Indonesia. Biodiversitas 26: 94-101. Lengkauk* is an illness that affects children, resulting in symptoms such as weight loss, abdominal bloating, frequent fever, irritability, lethargy and weakness. Other characteristics include pale palms, soles and face, stunted growth and decreased appetite. The use of plants as traditional medicine for treating *lengkauk* in children in the Segedong Sub-district, Mempawah, West Kalimantan, Indonesia is still practiced by the local community, although this knowledge is primarily held by certain elderly individuals, such as local shamans and midwives. This study aimed to identify the types of plants used, the parts of the plants employed, the preparation methods and the treatment practices for managing *lengkauk*. A qualitative research methodology was utilized with data collection conducted through triangulation techniques including interviews, observations and documentation. The research identified six types of plants used to treat *lengkauk* (i) *bawang merah* (*Allium cepa*); (ii) *jengkol* (*Archidendron jiringa*); (iii) *kelapa hijau* (*Cocos nucifera*); (iv) *lempuyang* (*Zingiber zerumbet*); (v) *moje* (*Barleria cristata*); and (vi) *sirih hijau*). The parts of the plants used include leaves, bulbs, fruits and rhizomes. These six plants belong to different families: Acanthaceae (*B. cristata*), Amaryllidaceae (*A. cepa*), Arecaceae (*C. nucifera*), Fabaceae (*A. jiringa*), Piperaceae (*P. betle*) and Zingiberaceae (*Z. zerumbet*).

Keywords: Children, *lengkauk* disease, *lengkauk* oil, medicinal plants, traditional medicine

INTRODUCTION

Indonesia is referred to as a megadiverse country due to its high biodiversity (Arbiastutie et al. 2021; Liebke et al. 2021; Hapid et al. 2023; Fajar et al. 2024). It is estimated that there are between 30,000 and 40,000 plant species distributed throughout Indonesia (Novaryatiin and Indah 2019; Panjaitan et al. 2024; Rahayu et al. 2024), with around 20,000 species having potential as medicinal plants (Pit'ay et al. 2019; Cahyaningsih et al. 2021). Medicinal plants are essential resources that possess therapeutic properties and can serve as antioxidants (Babu et al. 2019; Diastuti et al. 2022; Nugroho et al. 2022; Assiry et al. 2023). Medicinal plants are closely linked to traditional medicines as they serve as key components in treatment processes (Rahmawaty et al. 2019; Elisetana et al. 2023; Novra et al. 2023).

Traditional medicine is a form of local wisdom in the health sector that has been widely practiced in Indonesia (Komala et al. 2019; Panjaitan et al. 2021; Panjaitan et al. 2022). It represents a plant-based healing method grounded in knowledge, experience and skills passed down through generations (Budiarti et al. 2020; Indradi et al. 2023; Wangelamo et al. 2023). Traditional medicine is popular and frequently utilized due to its accessibility, affordability, ease of preparation and safety as it typically has fewer side effects (Courric et al. 2023; Panjaitan et al. 2023; Tabuti et al. 2023; Ramadaini et al. 2024). Generally, knowledge regarding traditional medicine is held by rural communities living in proximity to forested areas (Hashimoto et al. 2019; Wali et al. 2022; Wirasisya et al. 2023).

One of the regions with knowledge of local wisdom related to traditional medicine is Segedong Sub-district, Mempawah, West Kalimantan Province, Indonesia. Based on preliminary interviews with traditional healers in Segedong conducted on July 22, 2023, we obtained information regarding an illness known as *lengkauk*. The interviews also revealed that the treatment for *lengkauk* involves various herbal concoctions, prepared in different ways and this knowledge is typically held by specific individuals passed down through family lineages. In addition to utilizing traditional treatment methods, the community in Segedong Sub-district also seeks care for *lengkauk* disease at the Community Health Center (*Puskesmas*) located in the district. Based on preliminary interviews with healthcare workers at the Community Health Center (*Puskesmas/ Pusat Kesehatan Masyarakat*) in Segedong Sub-district, in the medical realm, *lengkauk* disease is characterized as a condition of malnutrition accompanied by comorbidities.

Malnutrition is a global health issue, including in Indonesia (Octavia and Rachmalina 2022). Malnutrition can be defined as an imbalance between energy and nutrient intake that affects the size, composition and function of the body (World Health Organization 2020). Worldwide, 6.3 million children under the age of five die each year, with nearly half of these deaths attributed to malnutrition-related issues (Simwanza et al. 2023). The 2022 Indonesian Nutrition Status Survey (SSGI) recorded an increase in the prevalence of malnutrition among children under five, rising from 7.1% in 2021 to 7.7% in 2022 (Kementerian Kesehatan Republik Indonesia 2023). The results of preliminary interviews also showed that there are still many toddlers continue to suffer from *lengkauk* disease or malnutrition with accompanying comorbidities. Out of a target population of 2,000, approximately 200 toddlers are affected by this condition.

There are various factors that can contribute to malnutrition, such as low birth weight, feeding problems, diarrhea and social factors like low socioeconomic status. Children who experience nutritional deficiencies are at high risk of cognitive and motor development delays and are estimated to have more vulnerable social lives. These long-term consequences can be highly detrimental. Therefore, strategies are needed to prevent cases of undernutrition (Kamil et al. 2021). Traditional medicine is an alternative healing approach used to address various illnesses and has become a socio-cultural phenomenon and a national heritage that is deeply integrated into Indonesian society, both in rural and urban areas (Gangaram et al. 2022; Syabaniah et al. 2023). Several studies have examined the use of plants as traditional medicine in Mempawah District, including the use of medicinal plants by traditional healers in Sepang Village (Pagea et al. 2022), the utilization of mangrove plants for medicinal purposes by the community in Mendalok Village (Arbiastutie et al. 2021), the use of medicinal plants from secondary forests by residents of Sekabuk Village (Hashimoto et al. 2019), and a study on the utilization of medicinal plants by traditional healers to address physical trauma in Pak Laheng Village, Toho Sub-district, Mempawah, West Kalimantan, Indonesia (Angela et al. 2022).

Plant-based traditional medicine represents a valuable cultural heritage that needs to be preserved and developed to prevent its loss over time (Gao et al. 2019; Kuswanto et al. 2021; Asigbaase et al. 2023; Mulugeta et al. 2024). Observations indicated that the community in Segedong Sub-district continues to practice a strong culture of local wisdom, utilizing traditional medicine as the primary means of treating illnesses. However, it is regrettable that there has been no documentation of the medicinal knowledge related to *lengkauk* disease in children in Segedong Sub-district, Mempawah District. To preserve this knowledge, it is essential to inventory the medicinal plants utilized by the community in Segedong Sub-district. This research aimed to provide initial information to the community regarding the types of medicinal plants, the preparation of herbal remedies and the treatment processes.

MATERIALS AND METHODS

Study area

Segedong Sub-district is located in Mempawah District, West Kalimantan, Indonesia (Figure 1). The area of Segedong Sub-district is 164.00 km^2. The distance from Segedong to Mempawah is 50 km. The district is bordered by Sungai Pinyuh District to the north, Kubu Raya District to the east, Siantan District and Kubu Raya District to the south and the Karimata Strait to the west. Segedong Sub-district consists of six villages (i) Parit Bugis ; (ii) Peniti Besar (iii) Peniti Dalam I; (iv) Peniti Dalam II; (v) Sungai Burung; and (vi) Sungai Purun Besar. There are four villages that became the research sites, namely (i) Parit Bugis; (ii) Peniti Besar; (iii) Peniti Dalam I; and (iv) Peniti Dalam II.

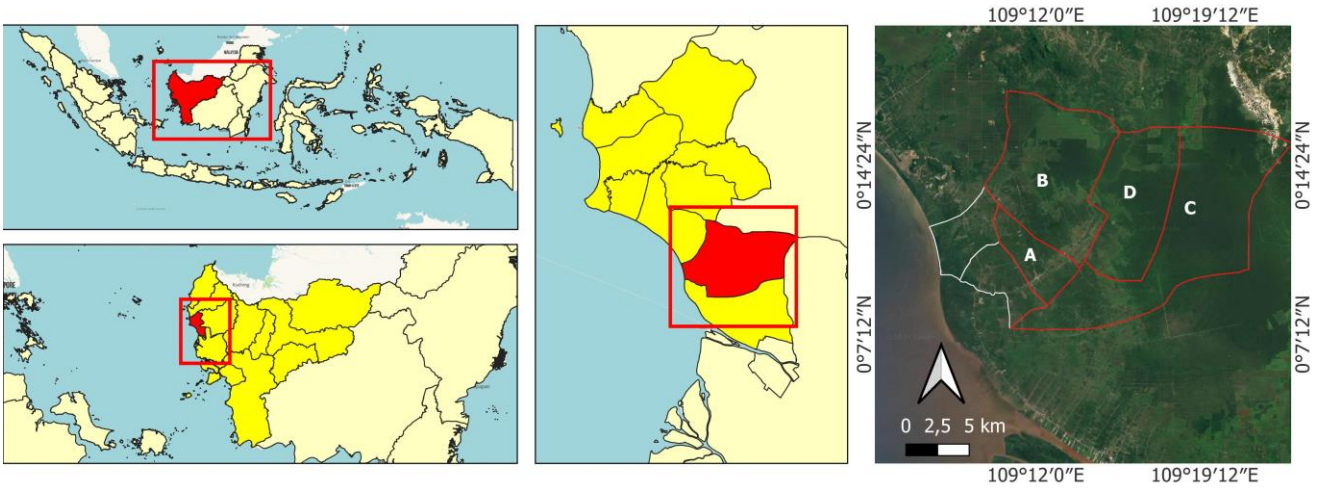

Figure 1. Map of the research area. A. Parit Bugis; B. Peniti Besar; C. Peniti Dalam I; and D. Peniti Dalam II Segedong Sub-district, Mempawah, West Kalimantan, Indonesia

Data collection

The study focused on the identification of medicinal plant species, the parts used, preparation methods and treatment practices for managing *lengkauk* disease in children. A qualitative research methodology was employed. Informants were selected using purposive sampling, resulting in a total of four informants, which included one village midwife and three local shamans. Data collection utilized triangulation techniques, including interviews, observations and documentation (Ristoja 2015). Plant data were gathered based on the results of interviews and observations. Observations were conducted to collect and document plant samples. Subsequently, plant identification was carried out at the Biology Laboratory of the Faculty of Mathematics and Natural Sciences, Universitas Tanjungpura. The results of the identification of medicinal plants were documented under letters 183/A/LB/FMIPA/UNTAN/2023 and 196/A/LB/FMIPA/UNTAN/2023.

Data analysis

The data analysis employed in this study is qualitative descriptive analysis. Information obtained from the informants regarding plant types, the parts used and the processing methods for medicinal plants is presented in narrative form, accompanied by with images and tables that display the results of the interviews.

RESULTS AND DISCUSSION

Medicinal plants used for treating *lengkauk* disease

Based on the research conducted in Segedong Sub-district, a disease was identified that is treated with plants. This condition is referred to by the local community as *lengkauk*. *Lengkauk* is an illness that affects children aged approximately 3 months to 3 years, resulting in symptoms such as weight loss, frequent fever, irritability, lethargy, weakness and abdominal bloating. Additional characteristics include pale palms, soles and face, stunted growth and decreased appetite. In children affected by *lengkauk*, weight loss signifies low body weight and stunted growth, which are not aligned with developmental milestones for their age. The abdominal bloating observed in these children is caused by excessive gas accumulation in the digestive tract. Moreover, children suffering from *lengkauk* often exhibit behavioral changes, particularly at night, becoming excessively fussy and restless, which leads to frequent crying. They also appear lethargic and weak due to reduced appetite, resulting in insufficient energy intake. A notable symptom that traditional healers commonly observe upon first examining a child with *lengkauk* is the pale appearance of the palms, soles and face, suggesting a lack of blood circulation.

Based on preliminary interviews with healthcare workers at the Community Health Center (*Puskesmas/ Pusat Kesehatan Masyarakat*) in Segedong Sub-district also indicated that the diagnosis of *lengkauk* disease or malnutrition with comorbidities is conducted through physical examinations, medical interviews, and supplementary tests. This diagnosis encompasses the evaluation of nutritional status and anthropometric assessment in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2020 regarding Child Anthropometric Standards (Kementerian Kesehatan Republik Indonesia 2020), as well as supplementary examinations such as blood tests and protein status assessments. Anthropometry is a method used to evaluate the size, proportions and composition of the human body, including measurements of height, weight and the determination of growth status (Puriastuti et al. 2024). Subsequently, interventions and education are primarily focused on addressing the comorbid conditions first, such as cough, diarrhea or pulmonary tuberculosis. Once the child's condition improves and weight gain is observed, attention will then shift to nutritional rehabilitation.

There are six plants used to treat *lengkauk* disease in children, each belonging to different families namely Acanthaceae for *moje* (*Barleria cristata*), Amaryllidaceae for *bawang merah* (*Allium cepa*), Arecaceae for *kelapa hijau* (*Cocos nucifera*), Fabaceae for *jengkol* (*Archidendron jiringa*), Piperaceae for *sirih hijau* (*Piper betle*) and Zingiberaceae for *lempuyang* (*Zingiber zerumbet*) (Figure 2). The parts of the plants used also vary, including leaves, bulbs, fruit and rhizomes. The leaves are utilized from *A. jiringa*, *B. cristata*, and *P. betle*. The bulb is used solely from *A. cepa*, the fruit only from *C. nucifera* and the rhizome only from *Z. zerumbet*. The most frequently used part is the leaf, which is employed in three of the plants (Table 1).

Herbs making and traditional medicinal methods for treating *lengkauk*

The preparation of *bawang merah* (*A. cepa*), *jengkol* (*A. jiringa*), *kelapa hijau* (*C. nucifera*), *lempuyang* (*Z. zerumbet*), *moje* (*B. cristata*) and *sirih hijau* (*P. betle*) for treating *lengkauk* in children can involve combining multiple plants or using just one. According to the research findings, the four traditional healers employed different treatment methods. The first informant applied the herbal remedy to specific areas of the body; the second informant used spraying and application of the herbal mixture over the entire body; the third informant performed massage and application of the herbal remedy across the whole body; and the fourth informant bathed the child with water mixed with the herbal concoction.

Traditional medicine for treating *lengkauk* in children involves various preparation methods and treatment approaches. The first informant, located in Parit Bugis Village, described a two-stage process: the production of coconut oil and the preparation of *lengkauk* oil (Figure 3). The first stage involves making coconut oil, where the coconut fruit is halved, and the flesh is extracted while the coconut water is poured into a separate container. The coconut flesh is grated using a grater placed over another container, then the coconut water and grated flesh are mixed and squeezed to obtain coconut milk. This coconut milk is then heated in a pan while being stirred until oil rises to the surface. Once the oil appears, it is collected and stored in a clean, covered container. The second stage involves preparing the *lengkauk* oil. Five finger roots of *lempuyang* are pounded with a pestle until finely ground.

The ground *lempuyang* is then mixed with 100 mL of coconut oil and one piece of solid soap (specifically, cat soap) while stirring together. The combined mixture is placed in a closed container, such as milk can. It is recommended that the *lengkauk* oil be used while warm and applied to specific areas of the child's body affected by the disease, including the ears, back of the neck, wrists and ankles, elbows and knees.

The first informant administers two treatment stages for children suffering from *lengkauk*: bathing the child with warm water and applying the herbal remedy to specific areas of the body, including the ears, back of the neck, wrists and ankles, back, elbows and knees (Figure 4). Several guidelines are followed during the treatment: the herbal remedy must be heated each morning and evening, the treatment should be given for a maximum of five to six months, and if the coconut oil runs out but the other ingredients remain, it is permissible to add more coconut oil. The herbal remedy is allowed to absorb into the child's body and can be left on during sleep. The first informant indicated that there are no specific prohibitions to follow before or after treatment.

Figure 3. Preparation method for *lengkauk* oil by the first informant. A. Ground *lempuyang* (*Zingiber zerumbet*); B. *Lengkauk* oil prepared by the first informant

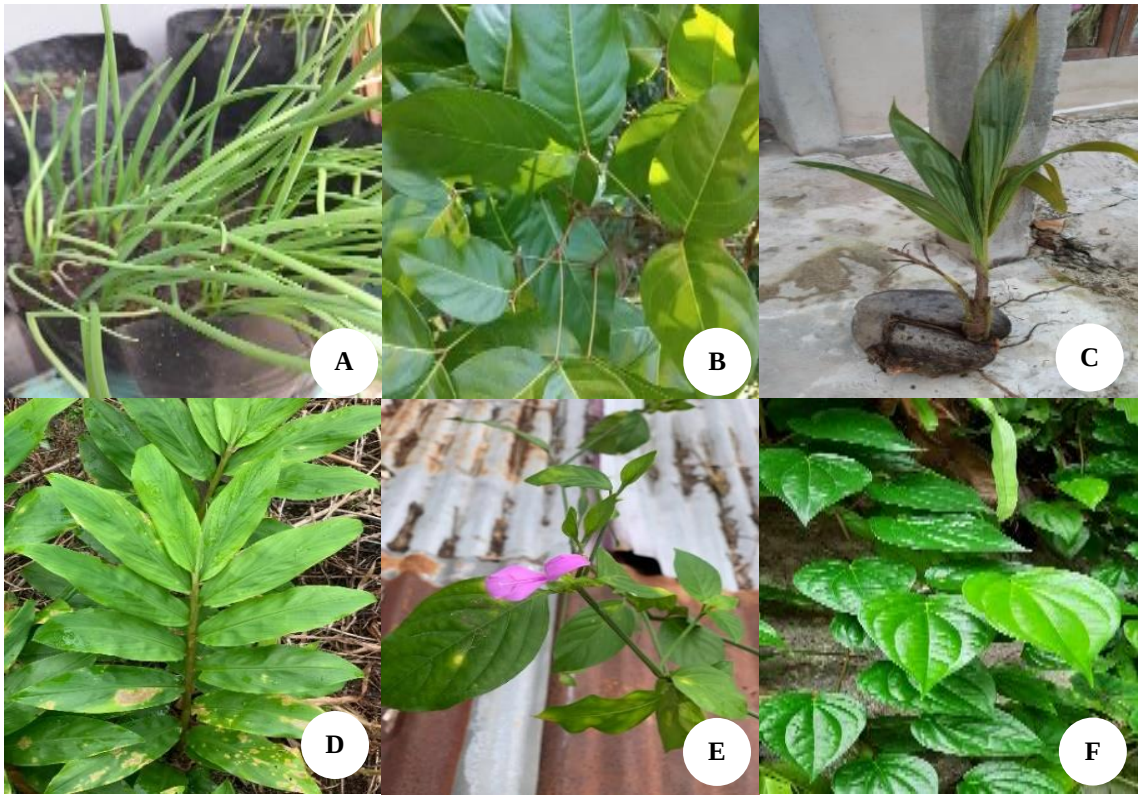

Figure 2. The plants used to treat *lengkauk* disease in children. A. *Bawang merah* (*Allium cepa*), B. *Jengkol* (*Archidendron jiringa*), C. Green coconut (*Cocos nucifera*), D. *Lempuyang* (*Zingiber zerumbet*), E. *Moje* (*Barleria cristata*), F. *Sirih hijau* (*Piper betle*)

Table 1. Types of medicinal plants for treating *lengkauk* disease in children

Family name	Scientific name	Local name	Part used
Acanthaceae	*Barleria cristata* L.	*Moje*	Leaf
Amaryllidaceae	*Allium cepa* Linn.	*Bawang merah*	Bulb
Arecaceae	*Cocos nucifera* L.	*Kelapa hijau*	Fruit
Fabaceae	*Archidendron jiringa* (Jack.) I.C. Nielsen	*Jengkol*	Leaf
Piperaceae	*Piper betle* Linn.	*Sirih hijau*	Leaf
Zingiberaceae	*Zingiber zerumbet* (L.) Roscoe ex Sm.	*Lempuyang*	Rhizome

The second informant, located in Peniti Besar Village, has two stages for preparing the herbal remedy: one for the spraying process and another for the main *lengkauk* oil used for application (Figure 5). The preparation method for the spraying remedy involves slicing five leaves of *sirih hijau* and three shallots (*bawang merah*) into smaller pieces using a knife. All the ingredients are then mixed and ground until smooth, followed by the addition of 250 mL of river water. For the application remedy, three finger roots of *lempuyang* and seven leaves of *moje* are ground separately. These ingredients are then combined in a clean basin. The mixture is shaped like bread and dried under sunlight on a tray. Once the herbal remedy is dried, it is placed in a jar and is ready to be used for treating *lengkauk* in children.

The second informant administers two stages of treatment for children with *lengkauk*: spraying with the herbal remedy and applying the main *lengkauk* remedy (Figure 6). The spraying stage utilizes the herbal remedy mixed with surface water, and it is performed before sunset time, continuing through the night until morning. The estimated duration for the spraying is every 15 to 30 minutes. The following morning, the second stage, application of the main *lengkauk* remedy, is conducted. For each application, one piece of the herbal remedy that has been shaped and dried like a cake is used. This piece is placed in a milk can, combined with 250 mL of river water, and heated on the stove. Once the herbal remedy and water are mixed and warm, it is then applied to the entire body of the child suffering from *lengkauk*. The informant emphasized that no additional water should be added to the heated herbal remedy, recommending that the child be treated in a bowl. There are also specific prohibitions during the treatment of *lengkauk* disease in children, including not consuming stingray, jackfruit leaves and jackfruit for one year.

The third informant, located in Peniti Dalam I Village, employs a single stage of preparation using only one plant: the rhizome of *lempuyang* (Figure 7.A and 7.B). The preparation method involves blending fifteen finger roots of *lempuyang* until finely ground. Then, sufficient water is added to the mixture and stirred until well combined. The remedy is placed in a covered bowl. It is used by applying it to the body of the child affected by *lengkauk* disease. The third informant administers two treatment stages: massage and application of the herbal remedy, which has been prepared to a cream-like consistency (Figure 7.C). The massage is performed two to three times a week on alternating days. After the massage, the application stage follows, using the herbal remedy prepared as a cream, which is done every morning or evening. If applied in the morning, bathing in the evening is permitted; conversely, if applied in the evening, bathing in the morning is allowed. The informant does not have any prohibitions but recommends using warm water or boiled water for bathing. After application, the child should not be dressed immediately, allowing the remedy to dry and absorb into the body of the child suffering from *lengkauk*. After 15 minutes, the child can be dressed to prevent exposure to cold air.

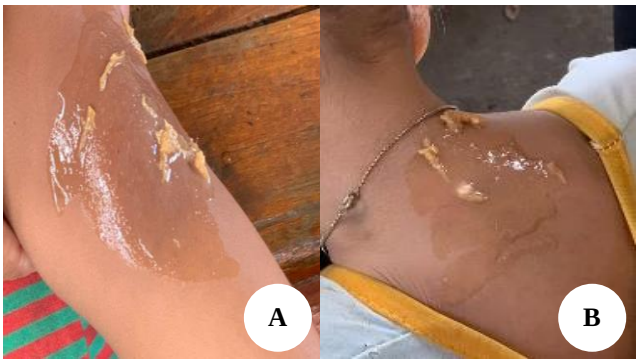

Figure 4 Treatment method for *lengkauk* by the first informant. A. Application of *lengkauk* oil on the wrist; B. Application of *lengkauk* oil on the back of the neck

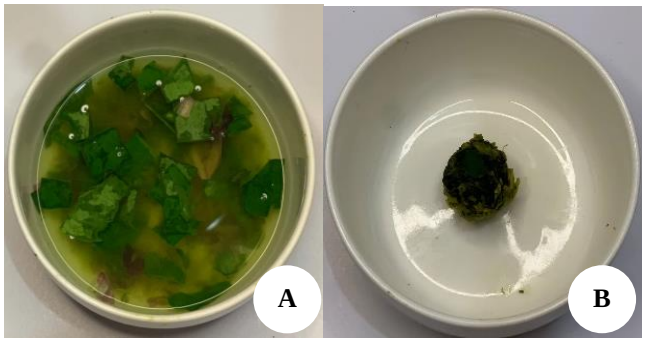

Figure 5. Preparation method for *lengkauk* remedy by the second informant. A. *Lengkauk* remedy for the spraying stage; B. Main *lengkauk* remedy for the application stage

Figure 6. Treatment method for *lengkauk* by the second informant. A. Spraying the lengkauk remedy on the child's back; B. Applying the lengkauk remedy on the child's back

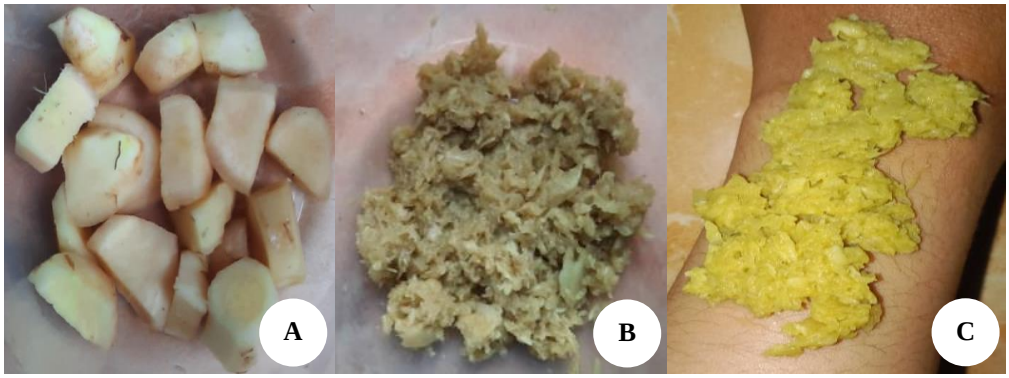

Figure 7. Preparation and treatment method for *lengkauk* remedy by the third informant. A. *Lempuyang* (*Z. zerumbet*) cut into several pieces; B. *Lempuyang* ground into a paste; C. Application of the external remedy on the child's hand

Figure 8. Preparation and treatment method for *lengkauk* remedy by the fourth informant. A. Mixture of *bawang merah* (*A. cepa*) and *lempuyang* (*Z. zerumbet*) that has been ground; B. *Lengkauk* remedy used for bathing; C. Bathing stage using the *lengkauk*

The fourth informant located in Peniti Dalam II Village, employs a single preparation stage for the herbal remedy used during bathing (Figure 8.A and 8.B). The preparation method involves finely slicing three shallots (*bawang merah*) and three finger roots of *lempuyang* using a knife. *Bawang merah* and *lempuyang* are then mixed with seven leaves of *moje* and five leaves of *jengkol* and mashed until smooth and well combined. Next, sufficient boiled water is added to the mixture for bathing. Once mixed, the remedy is ready for use in bathing the child affected by *lengkauk* disease. The fourth informant conducts a single treatment stage, which involves bathing with the herbal remedy (Figure 8.C). The boiled water used for bathing is mixed with the prepared herbal remedy. During the bath, the herbal mixture is applied by rubbing it over the entire body of the child affected by *lengkauk* every morning and evening. The informant advises against bathing with plain water, specifically unboiled water or rainwater.

Phytochemical content in plants

In addition to being effective for treating *lengkauk*, these plants also contain phytochemicals that are beneficial for other medicinal purposes. Research by Wali et al. (2022) shows that shallots (*A. cepa*) contain alkaloids, tannins, flavonoids and phenols. Furthermore, shallots exhibit pharmacological activities including antidiabetic, anti-inflammatory, antibacterial, antispasmodic, diuretic, antiseptic, antigenotoxic, antimutagenic, antiparasitic, antimicrobial, antipyretic, antioxidant, analgesic and cytotoxic properties (Marefati et al. 2021; Ramadaini et al. 2024). Research by Komala et al. (2019) indicates that *jengkol* (*A. jiringa*) contains saponins, alkaloids, terpenoids, steroids, tannins, glycosides and flavonoids. Hidayah et al. (2019) found that *jengkol* has antioxidant, antiviral, antibacterial, antimutagenic and anticarcinogenic properties. Moreover, *kelapa hijau* (*C. nucifera*) contains compounds that provide antioxidant, antimicrobial, antibacterial, antiviral, antifungal, anticancer, immune-boosting and digestive system-enhancing benefits (Asigbaase et al. 2023; Rizwana et al. 2023). Kannaian et al. (2020) also demonstrated the pharmacological activities of *kelapa hijau* including flavonoids, alkaloids and saponins.

The plant *lempuyang* (*Z. zerumbet*) has pharmacological activities including antioxidant, antimicrobial, anticancer, antileukemia, antimalarial, anti-inflammatory, anti-allergic, antitumor, immunosuppressive properties, antiproliferative, and anti-dementia (Ahmad et al. 2023; Assiry et al. 2023). Additionally, *lempuyang* contains various compounds such as tannins, phenolics, flavonoids, steroids, triterpenoids and alkaloids (Diastuti et al. 2022; Yeh et al. 2022). Research by Gangaram et al. (2022) indicates that *moje* (*B. cristata*) also demonstrated pharmacological activities including anti-inflammatory, antibacterial, antifungal and hepatoprotective properties. Research by Krishana et al. (2024) shows that

sirih hijau (*P. betle*) contains alkaloids, flavonoids, tannins and phenols. Moreover, *sirih hijau* exhibits pharmacological activities such as antibacterial, antiparasitic, antifungal, stimulant, carminative and aphrodisiac effects (Kurnia et al. 2020).

In conclusion, this research identified six types of plants used to treat *lengkauk* (i) *bawang merah* (*A. cepa*); (ii) *jengkol* (*A. jiringa*); (iii) *kelapa hijau* (*C. nucifera*); (iv) *lempuyang* (*Z. zerumbet*); (v) *moje* (*B. cristata*); and (vi) *sirih hijau* (*P. betle*). The parts of the plants used include leaves, bulbs, fruits and rhizomes. The leaves are utilized from *A. jiringa*, *B. cristata*, and *P. betle*. The bulb is used solely from *A. cepa*, the fruit only from *C. nucifera* and the rhizome only from *Z. zerumbet*. The most frequently used part is the leaf, which is employed in three of the plants. These six plants belong to different families: Acanthaceae (*B. cristata*), Amaryllidaceae (*A. cepa*), Arecaceae (*C. nucifera*), Fabaceae (*A. jiringa*), Piperaceae (*P. betle*) and Zingiberaceae (*Z. zerumbet*).

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