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RESEARCH ARTICLE

The utilization of medicinal plants in Kolaka local community: An ethnobotanical study

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Abstract: This research aims to find out, document, and analyze traditonal knowledge regarding plant types, processing methods, and compound contents used by the community in Kolaka District for wound healing treatments. The research method used is descriptive qualitative. The data collection techniques used observation and interviews. The results of this research show that there are 18 types of plants that are used as wound medicine in the community of Kolaka District with various methods of utilization, including grinding beans/seeds and leaves, extracting sap or essence from leaves, and using the plant stem sap, that is later applied to the injured parts of the body. The results of this research are expected to contribute academically to the field of ethnobotany, particularly concerning the utilization and developments of new medicines for various types of wounds on the body using natural ingredients, in order to anticipate dependence on chemical drugs or antibiotics which often have the potential to cause side effects. Additionally, through documenting types of plants and traditional wound treatment methods in this research, it is hoped that the preservation and originality of local knowledge regarding longstanding healthcare system within the community can be maintained.
Keywords: Ethnobotany, Medicinal plants, Local community, Local intelligence

Abstrak: *Penelitian ini bertujuan untuk mengetahui, mendokumentasikan, dan menganalisis pengetahuan tradisional mengenai jenis tumbuhan, cara pengolahan, dan kandungan senyawa yang digunakan oleh masyarakat di Kabupaten Kolaka untuk pengobatan luka. Metode penelitian yang digunakan adalah deskriptif kualitatif. Teknik pengumpulan data menggunakan observasi dan wawancara. Hasil penelitian ini menunjukkan bahwa terdapat 18 jenis tumbuhan yang digunakan sebagai obat luka pada masyarakat Kabupaten Kolaka dengan cara pemanfaatan yang beragam, antara lain dengan menggiling biji/buah dan daunnya, mengekstrak getah atau sari daun, dan menggunakan getah batang tumbuhan yang kemudian dioleskan pada bagian tubuh yang terluka. Hasil penelitian ini diharapkan dapat memberikan kontribusi akademis dalam bidang etnobotani, khususnya mengenai pemanfaatan dan pengembangan obat-obatan baru untuk berbagai jenis luka pada tubuh dengan menggunakan bahan-bahan alami, guna mengantisipasi ketergantungan terhadap obat-obatan kimiawi atau antibiotik yang sering kali berpotensi menimbulkan efek samping. Selain itu, dengan mendokumentasikan jenis-jenis tanaman dan metode pengobatan luka tradisional dalam penelitian ini, diharapkan kelestarian dan keaslian pengetahuan lokal mengenai sistem pengobatan yang telah lama ada di masyarakat dapat dipertahankan.*
Kata kunci: *Etnobotani, Tumbuhan obat, Masyarakat lokal, Kearifan lokal*

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1. Introduction

There are 7,000 types of plants in Indonesia, including medicinal plants, therefore almost all of the indegenous communies in Indonesia have developed plants for various medical purposes. Herbal medicine has been used by the public, long before formal health services entered the public domain with modern medicine. The tradition of traditional medicine has long been passed down from generation to generation (Suliasih, BA and Mun'im, A, 2022). At present, the utilization of herbal medicine has become an option for people to maintain health and treat illnes. This is due to the affordability of medicinal plants and their percieved lack of harmful effects on users (Rubianti et al, 2022).

The plant-based medicinal system in Indonesia is generally employed by communies based on individual experiences, which are later accomodated in their respective cultures, as expressed by Siregar et al. (2020) that knowledge of natural-based medicinal systems that grow around communites is acquired through experience and later developed based on the communities' culture. Meanwhile, Muktiningsih (2001), explains that the utilization of plants as medicine is based on considerations of high privilege, high incidence, and lack of health facilities. This shows that the utilization of medicinal plants is often an alternative when the situation experienced supports this, therefore in this context their use has not taken into account more comprehensive scientific aspects. So far, several plants are known to be very effective in maintaining health system. For example, among the Dani people of Papua, use *bunga landak*/porcupine flowers (*Baleria prionitis L*) and *pegagan*/gotu kola (*centela asiatica*) is recognized for treating bleeding wounds (Simbala, H.E, 2016).

The high prevelance of medicinal plants utilization, in reality, is not accompanied by written, scientific and structured documentation and inventory process. This is due to the information distribution regarding medicinal plants is only carried out through oral traditions which are very likely to experience distortion and have the potential to cause loss of this knowledge.In addition, the limited information distribution regarding medicinal plants has resulted in the exclusive utilization of these plants being limited to certain groups, communities and ethnic groups. Apart from that, according to Oktoba, Z (2018), the rapid flow of modernization has distanced society from various matters related to traditional knowledge, including the aspect of using plants as medicine. Therefore, it is important to carry out documentation, inventory and in-depth scientific studies regarding traditional knowledge related to herbal medicine, in addition to maintaining cultural preservation and the existence of very important local knowledge, it can also provide opportunities for innovation and development of medical systems that more varied and reliable.

The Kolaka District still constitutes a highland area covered with various types of plants, which can be found both in residential areas and in the wild forests, this makes Kolaka District rich in plant biodiversity, some of which are used as medicinal ingredients by the community. The community of Kolaka District is inhabited by multi-ethnic communities dominated by Tolaki Mekongga and Bugis ethnic groups who have been familiar with traditional natural medicine systems since ancient times. No exception in terms of treating various types of wounds, in treating wounds on the body, the community of Kolaka District often utilize various types of plants that can be obtained easily, whether in their home gardens, fields or forest areas.This knowledge later on becomes a legacy that continues to be passed down from generation to generation, however, social conditions, technological developments and increasingly sophisticated medical treatment systems have raised concerns on the existence of knowledge regarding natural herbal treatment systems in Kolaka District, including in the treatment of wounds as a problem which is often experienced by workers, particularly farmers and other field workers who are vulnerable to

work accidents. The absence of written records among the community of Kolaka District regarding knowledge of natural medicine systems in their culture, will ultimately lead to the problem of the loss and extinction of this knowledge. Therefore, efforts are required to document, disseminate and in-depth study related to local knowledge, including plant types, plant parts used, processing methods, usage methods, and compounds contained in plants.

2. Literature review

2.1. Medicinal plants

According to Martiningsih (2018) medicinal plants are one of a potential sources of natural wealth, considering their usefulness, cheaper and more affordable prices, ease of access to obtain these plants, as well as dissatisfaction and bad experiences with conventional medicine experienced by many people are the reasons selection of traditional treatment methods and systems (Triratnawati, 2016). The utilization of the entire plants or parts of plant organs as traditional medicine by the community has been going on for a long time. However, scientific studies regarding the types of plants and how to utilize them have not been widely disclosed, even though the practices of their application have been passed down from generation to generation by local communities since their ancestors. The utilization process continues to develop along with the development of community culture (Walukou, MA, 2023).

Indonesia is known for its diverse ethnicities with their distinctive characteristics. This ethnic diversity leads to differences in types of traditions, whether related to beliefs, ceremonies, or treatment using traditional medicine. The cultural diversity of these ethnicities also influences the types of traditional medicines, their dosage forms, and their processing techniques (Djarami, J et al, 2022). Among the ethnic groups that use traditional plants as medicine are the Dayak tribe, this indigenous tribe of Kalimantan has used plants as medicine for generations through special methods that have been adopted in their culture for a long time, some of which are the use of the *gelenggang*/candle cassia plant (*Cassia alata*) as medicine for itching and chickenpox, cassava leaves (*Manihot utilissima*) as medicine to reduce fever. Additionally, the Madurese tribes used *katuk*/star gooseberry plants (*Sauropus androgynus*) as herbal medicine to treat fever and wounds. The Simalungun tribe is also known to use the ginger plant as a medicine for diarrhea, internal heat and cough medicine (Situmorang & Sihombing, 2018).

2.2. Ethnobotany

Ethnobotany derives from the combination of the words “ethnology” which can be interpreted as the study of culture, and “botany” which is the study of plants. Ethnobotany is a field of study that explores the relationship between humans and plants. Ethnobotanical study reveals insights into the cultural practices of traditional societies in utilizing naturalresources, particularly plants, both directly and indirectly to support life such as food sources, medicine, traditional ceremonies, cultural interests, building materials, and more. One of ethnobotany that widely studied is medicinal plants, specifically forest products that have ecological, socio-cultural and economic benefits (Destryana & Ismawati, 2019). Ethnobotany has a very important function and role in knowing and understanding the causal relationship between humans and plants and also the environment in which they live (Kartika. et al., 2021).

As a country that is rich in cultural diversity as well as flora and fauna resources, conceptually, in essence, the Indonesian people have applied the concept of ethnobotany to meet their daily life necessities. Empirically, one example of the application of the

ethnobotanical concept in society is the utilization of *aren*/sugar palm plants (*Arenga pinnata Merr*) by various ethnic groups in Indonesia. The *aren* plants has many benefits, including in the technological sector it can be used as water channels, house pillars, and fuels. In the economic sector it can be used as brooms, roof tiles, brushes, natural packaging, ropes, sago, brown sugar, vinegar, palm fruit, palm sap, water channels, house pillars, and fuels. In the field of pharmacology it can be used as sago which can improve bone health due to its minerals, iron, potassium and copper content, while palm sugar can maintain digestive health due to its insulin content (Ridanti, Dharmono & Riefani , 2022).

2.3. Local tradition

As Rofiq explains (2019) that tradition is an important part of culture or civilization. With tradition, the cultural system will become stronger. However, if traditions are eliminated, therefore it is certain that the culture will disappear and become extinct. It is very important to understand that something turned into a tradition has a high level of trust, effectiveness and efficiency for its adherents, this is since the tradition always makes adjustments to the development of elements in culture. In reality, traditions will continue to be used and maintained if they are still relevant or in accordance with the conditions and needs of the community as their heirs. According to Irhandayaningsih (2018), nowadays traditions are starting to slowly experience degradation and some of them have even disappeared and become extinct. This is caused by several factors, namely: (1) Lack of public knowledge, particularly the younger generation, is no longer familiar with traditional culture; (2) Lack of public awareness to preserve community culture; (3) Many people think that local culture is just an ancient culture.

One example of a tradition that is starting to dissappear in Indonesia is "*tedhak siten*". *Tedhak siten* is a Javanese cultural practices that aimed at ensuring that children can grow and develop into successful people in the future with the blessing of God and guidance from their parents. Currently, *tedhak siten* tradition is increasingly diminishing due to the apathy of the Javanese people as the heirs and owners of this tradition. This is certainty cannot be separated from the influence of modernization, rapid technological developments in society and an education system that accommodates popular culture (Wibisono, P et al., 2022; Marsaban & Said, 2023). Therefore, it is precisely what Oktoba, Z (2018) mentioned that the rapid flow of modernization and technological development has distanced society from various things related to traditional knowledge.

3. Method

This research uses a qualitative descriptive approach to enable a deeper understanding and description of plant variations, differences in methods, and wound treatmen techniques derived from the local knowledge of Kolaka District community. Interview techniques and participant observation were the primary data collection methods used in this research, meanwhile secondary data in this research was obtained through literature studies regarding ethnobotanical studies of traditional wound treatment sourced from books, research journals and other academic literature. This research was conducted in Kolaka District, Southeast Sulawesi, involving 30 respondents from various groups, including farmers, employees, workers, housewives, medical personnel and students that selected through snowball sampling technique or rolling sample technique.

Data regarding the utilization of plants as wound medicine in Kolaka District community was later on analyzed through several stages starting with cross-checking the various information submitted by respondents, as well as between the respondents' opinions and the results of field observations, this aims to test its validity the data that has

been obtained. In the next stage, the analysis process continues by summarizing the data, specifically simplifying the data by sorting data that is relevant and irrelevant to the research focus. Next, the analysis process continues by carrying out data synthesis (synthesizing), namely combining various data elements to create a complete and comprehensive picture of natural plant-based wound treatments in Kolaka District community. And finally, narrating, namely interpreting data that has been previously combined and presenting it in narrative form in a descriptive, analytical and evaluative manner.

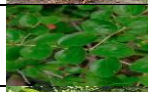
4. Result

Kolaka District is located in Kolaka Regency, precisely on the coast of Southeast Sulawesi Province, with unique geographical, cultural, and economic characteristics. This district is also known for its high biodiversity, this can be seen in the existence of tropical forests, agricultural land, and plantations where various medicinal plants grow which have been used by the community for generations. Demographically, Kolaka District is an area with ethnic diversity, including Tolaki Mekongga and Bugis ethnic groups as the majority in the region. This diversity in turn also influences ethnobotanical practices, particularly in the field of wound treatment.

4.1. Types of plants utilization as wound medicine

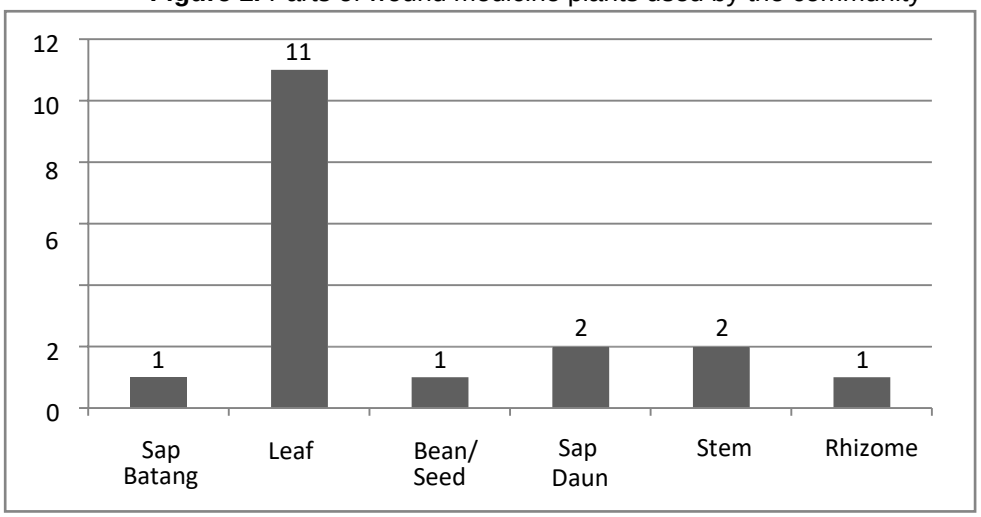
The utilization of medicinal plants for wounds by Kolaka District community is an activity that is often carried out as first aid when wounds occur. It is not uncommon for this condition to occur while working, particularly when using sharp objects. However, injuries that occur are often also caused by other factors such as infection, allergies, or even exposure to fire. The richness of plant biodiversity in Kolaka District has a positive impact on the availability of plants that can be used as wound medicine. In this context, herbal medicines derived from these plants can be ustilized by Kolaka District community as first aid or even the main medicine for the wounds they experience. Based on the results of the research, researchers identified that there are 18 types of plants used in wound treatment. The majority of them are utilized for their leaves. Meanwhile, there are also those that are utilized the rhizomes, seeds, sap and stems. The utilization of these various plants as wound medicine is based on knowledge sourced from oral traditions passed down from generation to generation. Specifically, the utilization of plant parts as wound medicine in Kolaka District community is presented in the table below:

Table 1. Types of medicinal plants used by the community.

Name of Plants			Parts Used	Image
General	**Local**	**Scientific**		
Pisang (banana)	Pisang (banana)	*Musa paradisiaca* L.	Stem	
Bidara (fig)	Bidara (fig)	*Ziziphus mauritiana*	Leaf	
Kopi (coffee)	Kopi (coffee)	*Coffea sp*	Bean/ seed	
Lulangan (goosegrass)	Belulang (goosegrass)	*Eleusineindica*	Leaf	
Lidah buaya (aloe vera)	Lidah buaya (aloe vera)	*Aloe vera* L.	Leaf	

Jarak (castor plant)	Cangi-cangi (castor plant)	*Ricinus C*L.	Leaf	
Yudium (coral plant)	Yudium	*Jatropha multifida* L.	Leaf	
Kayu Jawa (woolly marlock)	Kasudawa	*Lannea coromandelica*	Stem	
Cucur bebek (miracle leaf)	Cucurbebek	*Kalanchoepinnata*	Leaf	
Bandotan (billygoat weed)	Babando tan	*Ageratumconyzoides*	Leaf	
Patikala (torch ginger)	Kecombrang	*Etlingeraelatior*	Leaf	
Petai Cina (ipil plant)	Lamtoro	*Leucaena leucocephala*	Leaf	
Binahong (mignonette vine)	Taddalota	*Anrederacordifolia*	Leaf	
Patah tulang (pencil tree)	Patahtulang	*Euphorbiatirucalli*	Stem	
DaunAfrika (giant swamp taro)	Klorofil	*Cyrtosperma merkusii*	Leaf	
Kumis kucing (cat's whiskers)	Kumiskucing	*Orthosiphon aristatus*	Leaf	
Kelor (drumstick tree)	Kelor	*Moringa oleifera* L.	Leaf	
Kunyit (turmeric)	Kunyit	*Curcumalonga* L	Rizhome	

Figure 1. Parts of wound medicine plants used by the community



4.2. Methods of using plants in wound treatment

Based on the research results, it was discovered that there are various techniques for using each plant in treating wounds in Kolaka District community, including medicinal plants which are used by crushing them and later on separating the liquid from the solid

residu, while some other plants utilize their sap to be dripped onto wounds. Generally, the processing of plants into wound medicine is done in a simple manner, such as crushing them using a mortar or chewing them with the mouth. Additionally, the processing of medicinal plants used for wounds where the sap is extracted, such as banana plants, is done by injuring the stem or leaf of the plant until it releases sap, and later the sap is applied to the open wound. Specifically, processing techniques of plants into wound medicine in Kolaka District community can be seen in the table below:

Table 2. Methods for processing plants into medicine.

Name of Plants		Processing Method
General	**Scientific**	
Pisang (banana)	*Musa paradisiacal* L.	Injure banana stem to release sap and later flow the sap to the wound.
Bidara (fig)	*Ziziphus mauritiana*	Grind *bidara* leaves and later extract the essence that comes out of the crushed *bidara* leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Kopi (coffee)	*Coffea sp*	Grind coffee beans into powder, and later apply the coffee powder to the wound.
Lulangan (goosegrass)	*Eleusine indica*	Crush or chew *lulangan* leaves and later extract the essence that comes out of the crushed *lulangan* leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Lidah Buaya (aloe vera)	*Aloe vera* L.	Injure the aloe vera leaf to release sap, and later flow the sap to the wound.
Jarak (castor plant)	*Ricinus communis* L.	Pick *jarak* leaves and later the leaves will release sap. Flow the sap to the wound.
Yudium (coral plant)	*Jatropha multifida* L.	Crush *yudium* leaves and later extract the essence that comes out of the crushed *yudium* leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Kayu Jawa (woolly marlock)	*Lannea coromandelica*	Take a stem from *kayu jawa*, peel it, and later apply it to the wound.
Cucurbebek (miracle leaf)	*Kalanchoepinnata*	Grind *cucurbebek* leaves, later extract the essence that comes out of *cucurbebek* leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Bandotan (billygoat weed)	*Ageratum conyzoides*	Crush *bandotan* leaves and later extract the essence that comes out of *bandotan* leaves. Next, apply the essence to the wound and affix the the leaves to the wound.
Patikala (torch ginger)	*Etlingera elatior*	Grind *patikala* leaves and later extract the essence that comes out of *patikala* leaves. Next, apply the essence to the wound and affix the leaves to the wound.
PetaiCina (ipil plant)	*Leucaena leucocepha*	Crush or chew *petai cina* leaves and later extract the essence that comes out of the crushed leaves. Next, apply the essence to the wound and affix the leaves to the wound.

Binahong (mignonettevine)	*Anrederacordifolia*	Grind *binahong* leaves and later extract the essence that comes out of the crushed leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Patah Tulang (pencil tree)	*Euphorbia tirucalli*	Break the stem of *patah tulang* plant and later let the latex flow to the wound.
Klorofil (giant swamp taro)	*Cyrtospermamerkusii*	Crush *klorofil* leaves and later extract the essence that comes out of crushed leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Kumiskucing (cat's whiskers)	*Orthosiphonaristatus*	Crush *kumis kucing* leaves and later extract the essence that comes out of the crushed leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Kelor (drumstick tree)	*Moringa oleifera*	Grind kelor leaves and later extract the essence that comes out of the crushed leaves. Next, apply the essence to the wound and affix the leaves to the wound.
Kunyit (tumeric)	*Curcuma longa*	Take tumeric rhizome and later crush it and apply to the wound.

Table 2 shows a method for processing plants into wound medicine in Kolaka District community. This method has become a common practice among local community in treating various illnesess they experience.

5. Discussion

The findings in this study show that the wound medicine used by local community comes from plants around them. The plants that can be used as wound medicine for local people include bananas, which are easily grown in Kolaka District. In addition being a source of food, Kolaka District community also utilized banana plants as wound medicine. According to Ningsih, et al, (2019) banana sap contains tannin, a chemical compound that acts as antiseptic properties and can heal wounds. Additionally, bananas also contain flavonoids and saponins which function as antibiotics that reducing and inhibiting bleeding, as well as stimulating the process of new cell growth. According to research results, the utilization of banana sap as a wound medicine is very effective. The resulting healing process is relatively faster. As stated by informant NR, "Just apply it once to the open wound, and within a few days, the wound will gradually heal" (NR/Farmer).

Coffee is also a plant that is very popular in Kolaka District community. Coffee is a type of plant that can grow easily in Kolaka District area. In addition being used as beverage, coffee has also been used in the treatment of diabetic ulcers. As informant Od mentioned, "Coffee beans are very effective in treating wounds and stopping bleeding" (Od/Farmer). In its application as a wound medicine, Kolaka District community grind coffee beans into powder and later on apply it to the wound. Based on research results, the use of coffee as a wound medicine is considered very effective, particularly for new wounds. According to Rubinadzari, et al (2022), coffee can be used to treat wounds since it contains compounds that are responsible for antibacterial activity, including caffeine, trigoneline, glyoxal, methylglyoxal, and chlorogenic acid.

Based on the research results, there are various methods used by Kolaka District community to process plants as wound healing medicine. In reality, there are differences in the effects produced by these plants in healing wounds, this is as explained by respondents that wound healing plants such as banana stems and *lamtoro* leaves are very effective in

reducing bleeding that occurs in new wounds. In this case, these two types of plants can be an alternative as first aid if a wound occurs. Meanwhile, other information provided by other respondents stated that *yudium* and *Kayu Jawa* leaves are quite effective in healing wounds even if they are not assisted by medical drugs. It has been proven that using the extracts from these plants in just a few days makes the wounds gradually improve.

Regarding their usage, several types of wound healing plants have differences that are identified based on how and how often they are used. Some types of plants are utilized by extracting the essence, crushing the leaves, taking the sap, or grinding the seeds/beans. Furthermore, the results of this processing are applied to wounds with varying intensities, namely plant types such as *francis* and *patikala* leaves which require several uses on the same wound to produce an accelerated healing effect, whereas according to the respondent's statement, banana sap and castor leaves require multiple applications on the same wound to accelerate the healing effects. Regarding the duration of wound healing, it also varies depending on the size of the wound and the physical condition of the wound sufferer. Based on information from all respondents, the medicinal plants used by Kolaka District community are very effective in treating wounds caused by sharp objects. Knowledge regarding the use of tmedical plants for wounds in Kolaka District community is obtained through experience and oral information passed down from generations. In this context, such information is part of the wound tradition treatment that is owned by the culture and ethnic groups of Kolaka District communty, therefore the type of utilization of wound healing plants in Kolaka District community also represents local knowledge derived from the culture of the Bugis and Tolaki Mekongga ethnic groups.

6. Conclusion

The multi-etnic community of Kolaka District The multi-ethnic community of Kolaka District possesses valuable local knowledge regarding the use of plants in wound treatments. There are 18 types of plants used by Kolaka District community as wound medicine, including bananas, *bidara* leaves, coffee beans, *lulangan* leaves, aloe vera leaves, *jarak* leaves, yudium leaves, *kayu jawa*, *cucurbebek* leaves, *bandotan* leaves, *pattikala* leaves, *lamtoro*, *binohang* leaves, *patah tulang* stems, *klorofil* leaves, *kumis kucing* leaves, kelor leaves and turmeric rhizomes. In utilizing plants for wound treatments, Kolaka District community use simple methods, such as grinding beans/seeds and leaves, extracting the leaf sap, and extracting the stem sap which is later on applied to new or old wounds. Most of the medicinal plants used or wounds by the Kolaka community are effective for wounds caused by sharp objects, burns, and even allergies. Knowledge regarding the use of plants as wound medicine in Kolaka District community is acquired through experience and oral traditions passed down through generations.

This research involved a limited number of informants using a single research method, making it challenging to draw strong generalizations to measure the quantitative impact regarding the use of wound healing plants in Kolaka District community. However, the findings of this research are very important in providing academic contributions in the field of ethnobotany, particularly in the health sector concerning the utilization and development of natural remedies for various types of wounds, thereby reducing dependence on chemical drugs or antibiotics which often have the potential to cause side effects. In addition, through the documentation of plant types and traditional wound treatment methods in this research, it can be a very effective effort in conserving traditional knowledge to face challenges in modern lifestyles which threaten the existence of long-standing local knowledge within the community.

Author Contribution Statement

Contributions of the authors in this article: La Ode Montasir contribute as concepts an analyzer. Andi Zaizafun Alfianti Salzabil contribute as a drafters. Nailah Amorita Syaqra Rafiun contribute as an interpreters. Mutiara Kasih contribute to collecting data. Al Marsaban as critically revising the article. All authors agree to take responsibility for all aspects of this work.

Disclosure of Interests

We have no conflict of interest to declare

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