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ETHNOBOTANICAL SURVEY OF MEDICINAL PLANTS USED TO TREAT DIABETES IN THE PEBAYURAN REGION, BEKASI, WEST JAVA, INDONESIA

Dissa Ayu Putri Andini, Dinar Salma Putri Utami, Abielza Yugha Geralda, Muhamad Rizki, Sarah Fajriyatulhuda, Agnes Dewi Maria, Ayu Jasmine Azzahra, Wianda Azzahra Audia, Zevania Toguria Nadeak, Tiara Maharani Angeline, Depita Nurapni, Amalia, Dhavid Twua Mangunsong, Achmad Fauzi Arasta Sukindar, Maulana Yusuf Alkandahri*

Faculty of Pharmacy, Universitas Buana Perjuangan Karawang, Karawang, West Java, Indonesia.

***Corresponding Author: Maulana Yusuf Alkandahri**
Faculty of Pharmacy, Universitas Buana Perjuangan Karawang, Karawang, West Java, Indonesia.

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ABSTRACT
Diabetes mellitus (DM) is one of the global health problems that continues to increase in prevalence, including in Indonesia. This disease is characterized by metabolic disorders that cause chronic hyperglycemia, which if not managed properly can trigger serious complications such as cardiovascular disease, neuropathy, and kidney failure. This research aims to document and preserve the use of ethnomedicinal to treat DM by communities in the Pebayuran Region, Bekasi, West Java, Indonesia. Fieldwork was carried out from October to December 2024 using direct interviews, questionnaires, and discussions. Plant species are identified based on standard taxonomic methods, flower morphological characteristics, and where possible, using samples for comparison, as well as consultation with experts and the literature. The plant types obtained were grouped into families according to the Cronquist classification system. Plant names were checked against the Plant List (www.plantlist.org) and the International Plant Name Index (www.ipni.org). This research reports that 30 plant species are commonly used by people in the Pebayuran Region to treat DM. Among the various plant parts used, leaves (60.0%) are most frequently used in making medicines, followed by rhizomes (16.7%), fruit (10.0%), rind (6.7%), stem, and bark (respectively 3.3%). Meanwhile, the most frequently used preparation methods were decoction (63.3%), followed by infusion (23.3%), and juice (13.3%). The results of this research confirm that people in the Pebayuran Region still rely heavily on medicinal plants for their health care system, especially for the treatment of DM with the most frequently used parts of the leaves and their use in decoctions and infusions.

KEYWORDS: Traditional medicine, Ethnomedicinal plants, Pebayuran Region, Diabetes Mellitus.

INTRODUCTION
Since past few decades type 2 diabetes has become a global health problem. As estimated by the World Health Organization more than 176 million people are suffering from this disease globally. The common cause of chronic morbidity and disability among the working population is the complications which are caused due to diabetes. Type 2 diabetes mellitus (DM) begins with a period of insulin resistance with increased pancreatic insulin secretion. As the disease advances, pancreatic functions are decreased and are no longer able to meet peripheral requirements. Thus, insulin levels fail to sustain with the body requirements.[1] Prevention and control of DM is carried out to keep individuals healthy and people who already suffer or have risk factors for this disease can control their disease so as not to cause complications or death. The International Diabetes Federation Organization (IDF) projects the number of people with diabetes in the population aged 20 -79 years in several countries in the world in 2019. Research from the IDF is able to show a list of 10 countries with the highest number of people with DM. Indonesia is ranked 7th among ten countries, with 10.7 millions of sufferers. Indonesia is the only country from Southeast Asia on the list, so it can be estimated that Indonesia's contribution to the prevalence of diabetes cases in Southeast Asia can be estimated. With the high number of sufferers in Indonesia, it is necessary to prevent and control the disease preventing and controlling the disease is necessary.[2,3]

Currently, research to obtain antidiabetic drugs derived from natural ingredients is continuing, one of which is through the exploration of active compounds from natural ingredients, especially medicinal plants that have traditionally been used by communities to treat DM in various regions in Indonesia.[4-6] One of the Region in Indonesia that still uses herbal plants as an alternative

treatment, especially to treat DM, is the Pebayuran Region. This research aims to obtain detailed information about the use of herbal plants for alternative therapy for DM in Pebayuran Region, Bekasi, West Java, Indonesia using a field survey method.

MATERIALS AND METHODS

Study Area

Pebayuran is located in Bekasi Regency, West Java, Indonesia, with an area of 83.04 km^2. This area has an altitude of 4 meters above sea level with an average maximum air temperature of 31°C and a minimum of 23°C. Moreover, it is located between 06°09′35″ South Latitude and 107°14′45″ East Longitude. This area is a tropical climate area that is mostly inhabited by Sundanese tribes (90%) and other tribes (10%). Vegetation in the study area is in humid conditions with an average rainfall of 2,898 mm/year.

Data Collection

An extensive field survey was carried out to obtain information about medicinal plants from the Sundanese tribe in the study area. To document existing information about medicinal plants from tribal practitioners, several field visits were conducted from October to December 2024 in the Pebayuran Region, Bekasi, West Java, Indonesia. During the research, ethnomedicinal information was collected from middle-aged and older tribal practitioners in their local language (Sundanese), through direct interviews, questionnaires, and discussions. Information on local names of plants, plant parts used, preparation methods and administration routes (e.g., infusion, paste, juice and decoction) of all ethnomedicinal plants collected were recorded during the survey period.

Botanical Identification

Plant species are identified based on standard taxonomic methods, flower morphological characteristics, and where possible, using samples for comparison, as well as consultation with experts and the literature.[7] The plant types obtained were grouped into families according to the Cronquist classification system, except for Pteridophyta and Gymnospermae.[8] Plant names were checked against the Plant List (www.plantlist.org) and the International Plant Name Index (www.ipni.org).

Ethics Statement

All participants provided verbal consent before the interview and gave consent to publish the information they provided.

RESULTS AND DISCUSSION

This research revealed that 30 plant species are commonly used by local people to treat DM (Table 1). This shows that the study location is affordable in terms of biodiversity. Among the various plant parts used, leaves (60.0%) are most frequently used in making medicines, followed by rhizomes (16.7%), fruit (10.0%), rind (6.7%), stem, and bark (respectively 3.3%). The use of leaves is reported to be easier to prepare and easier to extract active substances from them for treatment. At the same time, leaves have less effect on the mother plant.[9] Meanwhile, the most frequently used preparation methods were decoction (63.3%), infusion (23.3%), and juice (13.3%). These results are in line with previous research which reported that the forms of traditional medicine most widely used by the community were decoctions and infusions.[7]

Table 1: Ethnomedicinal plants, local name, part used, mode of administration, and dosage uses in Pebayuran, Bekasi, West Java, Indonesia.

No	Species	Family	Local name	Parts used	Mode of administration	Dosage of use
1	*Allium cepa L.*	Amaryllidaceae	Bawang bombai	Rhizome	Juice	10 grams once a day
2	*Allium fistulosum* L.	Amaryllidaceae	Bawang Daun	Leaf	Decoction	25 grams once a day
3	*Allium sativum L.*	Alliaceae	Bawang Putih	Rhizome	Juice	5 grams once a day
4	*Annona muricata* L.	Annonaceae	Sirsak	Leaf	Infusion	100 grams once a day
5	*Apium graveolens* L.	Apiaceae	Seledri	Leaf	Infusion	50 grams once a day
6	*Averrhoa carambola* L.	Oxalidaceae	Belimbing	Fruit	Infusion	150 grams once a day
7	*Carica papaya* L.	Caricaceae	Pepaya	Leaf	Decoction	200 grams once a day
8	*Chromolaena odorata* L.	Asteraceae	Balakacida	Leaf	Decoction	5 grams once a day
9	*Cinnamomum verum* L	Lauraceae	Kayu Manis	Bark	Decoction	10 grams once a day
10	*Cucumis sativus* L.	Cucurbitaceae	Timun	Fruit	Juice	500 grams once a day
11	*Curcuma longa* L.	Zingiberaceae	Kunyit	Rhizome	Decoction	20 grams once a day
12	*Curcuma xanthorhiza* Roxb	Zingiberaceae	Temulawak	Rhizome	Decoction	100 grams once a day
13	*Cymbopogon nardus*	Poaceae	Sereh Wangi	Leaf	Decoction	10 grams once a day
14	*Dracaena angustifolia* (Medik.) Roxb.	Asparagaceae	Suji	Leaf	Infusion	800 grams once a day
15	*Durio zibethinus* Murr.	Bombacaceae	Durian	Leaf	Decoction	200 grams once a day
16	*Garcinia mangostana* L.	Clusiaceae	Manggis	Rind	Decoction	30 grams once a day

17	*Kaempferia galanga* L.	Zingiberaceae	Kencur	Seed	Decoction	20 grams once a day
18	*Mentha longifolia* L.	Lamiaceae	Mint	Leaf	Infusion	500 grams once a day
19	*Morus* L.	Moraceae	Murbei	Leaf	Infusion	50 grams once a day
20	*Muntingia calabura* L.	Muntingiaceae	Kersen	Leaf	Decoction	30 grams once a day
21	*Ocimum sanctum* L.	Lamiaceae	Kemangi	Leaf	Decoction	100 grams once a day
22	*Orthosiphon aristatus* (Blume) Miq.	Lamiaceae	Kumis Kucing	Leaf	Decoction	20 grams once a day
23	*Pandanus amaryllifolius* Roxb.	Pandanaceae	Pandan	Leaf	Infusion	10 grams once a day
24	*Persea americana* Mill.	Lauraceae	Alpukat	Fruit	Juice	250 grams once a day
25	*Piper betle* L.	Piperaceae	Sirih	Leaf	Decoction	500 grams once a day
26	*Psidium guajava* L.	Myrtaceae	Jambu biji	Leaf	Decoction	100 grams once a day
27	*Punica granatum* L.	Lythraceae	Delima	Rind	Decoction	150 grams once a day
28	*Sandoricum koetjape* Merr	Meliaceae	Kecapi	Leaf	Decoction	50 grams once a day
29	*Vitis vinifera* L.	Vitaceae	Anggur	Leaf	Decoction	100 grams once a day
30	*Zingiber officinale* Rosc.	Zingiberaceae	Jahe	Rhizome	Decoction	10 grams once a day

CONCLUSIONS

The results of this research confirm that people in the Pebayuran Region still rely heavily on medicinal plants for their health care system, especially for the treatment of DM with the most frequently used parts of the leaves and their use in decoctions and infusions.

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