Ethnobotanical Study of Postnatal Medicinal Plants in the Ethnic Madurese in Bangkalan Regency, East Java, Indonesia

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Abstract

Postnatal period is a time for women to recover and take on new roles. Plants have an important role in the traditional posnatal care in many cultures around the world especially in rural areas. The use of medicinal plants is common among Madurese women especially to aid postpartum care. This research aimed to record the use of plants for postnatal care among the Madurese in Bangkalan Regency, East Java, Indonesia. Data were collected from local informants consisting of traditional birth attendants, herbal medicine makers, and herbal medicine sellers through open and semi-structured interviews. The data were analyzed quantitatively using the Use Value (UV), Family Use Value (FUV), and Index of Cultural Significance (ICS) parameters. There were 143 species of medicinal plants from 55 families identified as plants used for recovery during the postnatal period. Ginger is a plant that has the highest use value (1.84), followed by turmeric (1.81). There are five plant species which have very high ICS value. Ginger has the highest ICS value (168), followed by turmeric (132). The family with the highest FUV value was Zingiberaceae (0.79). Among the Madurese, medicinal plants are mostly used in multiherbal forms consisting of 2 to 30 plants. There are 13 kinds of concoctions used in postnatal care consisting of 8 multiherbal potions used orally and 5 herbs for external uses. Madurese women believe that the use of these herbs will speed up the postpartum recovery process and reduce postnatal diseases. This valuable knowledge should be continued to be applied by the young generation in order to maintain its existence and to conserve the plants used in this region.

Keywords*: Ethnobotanical Survey, Use Value (UVs), Family Use Value (FUV), Index of Cultural Significance (ICS), Bangkalan, Postnatal Care*

Introduction

Rural communities in various regions of the world are accustomed to use medicinal plants for maintaining their health[1]. The use of medicinal plants has become a habit of the Madurese community for maintaining health, preventing disease, treatment, health recovery, fitness, and beauty. Madurese traditional medicine is one of the most popular traditional herbs or potions in Indonesia. Madura is an island located in East Java Province, Indonesia. Most Madurese women are herbal users. Starting from the age of four or five years, Madurese girls have been introduced to herbal medicine. They are accustomed to use herbal medicines in any events, such as when they are married, pregnant, giving birth, and growing up[2]. Madurese women are very fanatical in terms of consuming herbal medicine which is reflected in their famous expression "*Ango'an tak ngakan atembang tak ajamo*" which means it is better not to eat than not to drink herbal medicine[3]. Consuming herbs for Madurese women is an obligation which is believed to be able to maintain youthfulness and create happiness in the household[4]. However, knowledge about this herb has decreased because young Madurese are less interested in learning about Madurese medicine and concoction formulas, especially young people who do not live in Madura. Because of school or work-related reasons, they no longer drink herbal medicine[5,6].

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Medicinal plants used to maintain women's health which are related to conditions such as female fertility, menorrhea, contraception, pregnancy, birth, postnatal, increasing breast milk, and caring for infants and children[7-12]. In traditional societies, includes Madurese, the use of this plant is increasingly emphasized during the treatment of pregnancy, childbirth, and postnatal. However, this research was focused on the use of herbs for postnatal care, because the days and weeks after delivery are a critical phase for a mother and the baby, due to most maternal and infant deaths occur in this phase[13].

Traditional plants are often used by ethnic groups around the world. This wisdom is passed down from one generation to the next and is believed to be able to overcome a number of postnatal complaints such as insomnia, anxiety and depression[14], inadequate breast milk [15], tiredness and pain[8]. Postnatal care ingredients in an ethnic group are usually used for the process of health recovery, the removal of lochia for uterine cleansing, prevention of bleeding, prevention of anemia, puerperal fever, headache during childbirth, perineal healing, uterine contraction, production of breast milk, preventing breast swelling, abdominal pain and others[9]. In Madura, postnatal herbs have been known to accelerate and restore the condition of the body and women's health.

Madura Island consists of four districts, namely Bangkalan, Sampang, Pamekasan, and Sumenep. Previous research on the use of plants in traditional Madurese medicine has been carried out in Sumenep region. Sumenep is an area that was once a palace. This location is considered as having authentic records of Madurese ethnic concoctions[5]. After the end of the Sumenep sultanate, the indigenous people learned the secrets of the potion from shamans or people close to the palace. Besides, the community also has its own local wisdom in the use of plants inherited from previous generations, including the Madurese in Bangkalan.

The purpose of this field study is to present information about postpartum care ingredients by the Madurese tribe in the Bangkalan area. Specific and quantitative research on this topic has never been done before. The documentation of medicinal plants and their use by ethnic Madurese in Bangkalan is important to protect the local knowledge about the use of medicinal plants for post-delivery care.

Materials and Methods

Research area

This research was carried out in 18 villages in Bangkalan Regency. Bangkalan is one of the districts in Madura Island, East Java Province, Indonesia. Its geographical position is between 112^0 40'06''-113^0 08'04'' E and 6^0 51'39''-7^0 11'39 S, at an altitude of 2-100 m above sea level. Bangkalan has a flat to hilly topography most of the area is used for agriculture activities. It covers an area of 1260,41 km^2, and had a population of 986,700 (http:// http://bappeda.bangkalankab.go.id/ the last access date 22.09.2020). The boundaries to the north are bordered by the Java Sea, to the east by the Sampang district, to the south and to the west by the Madura Strait. In terms of geographic location, Bangkalan Regency located on Madura Island, or to be exact is located on the west of Madura Island.

Data collection

Data collection was done using open and semi-stuctured interviews with Madurese informants using Madurese language in the houses, gardens, herbal shop and traditional market. The informants were selected using purposive techniques and snow ball sampling.[16] The informants must have the competence and information about the research topic. The selected informants were 31 people, which consisted of traditional birth attendants, herbal medicine makers, and herbal medicine sellers. Data taken included the types of concoctions for postnatal care, the composition of medicinal plants in the potion, the organs used, how to obtain the ingredients, how to manufacture, how to use, as well as the efficacy of each herb. The plants were identified using the standard book Flora of Java[17.]

Quantitative Analysis

Use value (UV)

Use values (UV) described the relative importance of the resource person (informant) to certain species of plants. UV was calculated using the following i formula[18]: $UV = \Sigma Ui/N$; U_i = the number of uses

mentioned by the informant for the species in question; N = the number of informants in the survey.

Family Use Value (FUV)

FUV is the average number of uses for each species in the family. The calculation formula[19] is as follows: FUV = ΣUVs/ns; UVs i= Use Value of species in the family; ns = total number of species in a particular family.

Index of Cultural Significance (ICS)

ICS or Index of Cultural Significance was calculated to assess the index of cultural importance of all plant species. The approach was carried out by adding a subjective allocation of scores or ranks to the plant use group by the researcher [20]. ICS value [21]was calculated using the formula:

$ICS = \sum_{i=1}^{n}(q\ x\ i\ x\ e)ni ICS = \sum_{i=1}^{n}(q\ x\ i\ x\ e)ni$; q = quality value; i = value of use intensity; e = value of exclusivity; ni = use category (1 to n).

Results and Discussion

Demographic characteristic

Informants in this research were native Madurese, had the experience of making herbal medicine for at least 5 years, and their knowledge was obtained from their anchestor passed from generation to generation. This research involved 31 practitioner informants who were mostly women (90.32%). From the participants, 19 people were aged between 46 and 60 years (61.29%), 9 were aged between 61 and 75 (29.03%), and 3 were aged of 75 years old or more (9.68%). The education background of the informants was mostly elementary school or they did not graduate from elementary school with a main job as a maker of herbal medicine (51.61%), traditional birth attendants (25.81%), and herbal medicine ingredient sellers (22,58%).

The demographic data showed that most informants were in the age range of 46-60 years. Those who were interested in the profession of traditional healers or herbalists or who knew the herbs were mostly middle-aged and older, while not many young families were interested in learning to make herbal medicine [23]. The data also showed that most informants were elementary school graduates and did not complete elementary school; there were more women than men. This was probably because initially the responsibility for family health in Madura rests with women or wives; those who worked as traditional birth attendants were women.

Medicinal plants used

The use of medicinal plants in concoctions made by herbal medicine sellers, saman, and old people in Madura is common. The interviews showed that there were 143 species of plants from 55 families used in postnatal potion. The use of medicinal plants in Madurese ethnic is not single but is a combination of several plants with certain compositions and properties that may differ between informants who follow the prescription of their ancestors. In general, the desired properties in postnatal potions are to launch breast milk, prevent bleeding, expel lochia, cure pain in the uterus and birth canal, and restore the body.

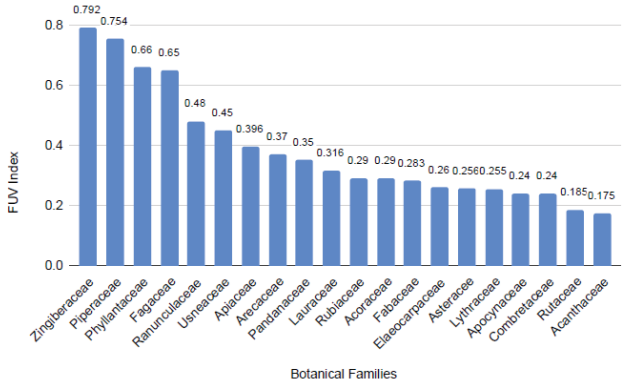

Figure 1. Family use value (FUV) of medicinal plants

The importance of plant was assayed by use values (UV) that were ranged between 0.03 for the less used species and 1.84 for the most used species. The most important plants are *Zingiber officinale* Rosc. (UV = 1.84), *Curcuma domestica* Val. (UV =1.81), *Boesenbergia pandurata* Roxb. Schlecht. (UV =1.71), *Tamarindus indica* L. (UV =1.68), *Piper betle* L. (UV =1.55), *Plucea indica* (L.) Ness. (UV =1.23), *Piper nigrum* L. (UV =1.19), *Alpinia galanga* (L.) Swartz (UV =1.03), *Phyllanthus niruri* L. (UV =0.87), *Elephantopus scaber* L. (UV =0.77), *Foeniculum vulgare* Miller (UV =0.74), *Coriandrum sativum* L. (UV =0.74), *Amomum cardamomum* Willd. (UV =0.74), *Piper retrofractum* Vahl. (UV =0.68), *Kampferia galanga* L. (UV =0.68),

Quercus infectoria Olv. (UV =0.65), and *Massoia aromatica* Bec. (UV =0.61).

Figure 1 and Figure 2 show a summary of the use of plants in postnatal of Madurese ethnic with the calculation of the family use value and the cultural index. The family with the highest FUV value was Zingiberaceae (Fig. 1). Members of this family were also widely used as a medicinal ingredient in several other ethnic groups[24-26]. Zingiberaceae was also a family of more than 1,300 members belonging to 52 genera. In Indonesia, a country with a tropical climate, Zingiberaceae can be found in various regions including Madura. The members of Zingiberaceae recorded in this research were 15 species.

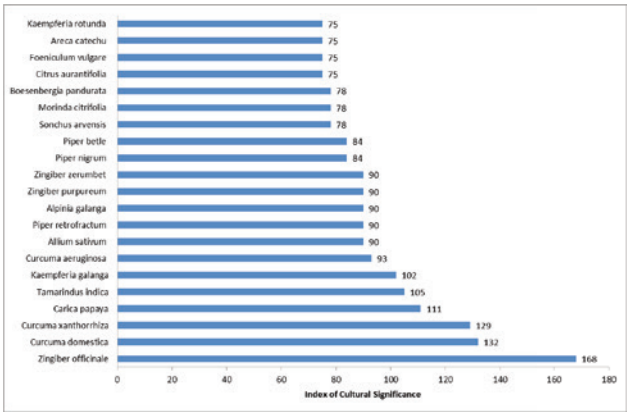

Figure 2. Index of cultural significance (ICS) of medicinal plants use in postpartum healthcare

The analysis of cultural significance index showed that five plant species have very high ICS. *Zingiber officinale* Rosc. has the highest value of ICS (168) among all the plants, followed by *Curcuma domestica* Val. (132) and *C. xanthorrhiza* Roxb. (129). The ICS value of medicinal plants is classified to be very low, low, medium, high, and very high[27]. These parameters show the importance of a plant in a community. The use of quantitative parameters was intended to identify plants that have a high use value and culture index in this region, so the results can be a reason for the continued existence of these plants in the Madura region and are useful for conservation. In addition, the results of the calculation of quantitative parameters can be further developed for research on the efficacy of species in the Zingiberaceae family for the treatment of female reproductive problems and other related diseases.

Zingiberaceae family members such as *Zingiber officinale*, *Z. zerumbet, Curcuma domestica*, *C. xanthorrhiza*, *C. aeruginosa*, and *Boesenbergia pandurata* are also used as plants for postnatal care by Sundanese in Cimande, West Java [28]. Likewise, these plants are also used by ethnic groups in Banten, West Java, along with *Kaempferia galanga* and *Amomum cardamomum* for postnatal recovery[29]. Other researchers also reported the use of *Z. officinale*, *K. galanga*, *Alpinia galanga* in the Dayak Tomun community for postnatal [30]. *B. pandurata*, *C. xanthorrhiza*, *C. zedoaria*, and *K. galanga* are used as astringent [31]. *Z. officinale* has anti-inflammatory, anti-hypertensive and anti-emetic activities [32].

Some plants that function as galactagogue both in Madura and other locations are *Sauropus androgynus*, *Trigonella foenum-graecum*, and *Foeniculum vulgare* [33,34]. These plants contain phytoestrogenic molecules which are proposed to have a galactagogue effect by inducing prolactin expression in the interior pituitary lactotropic cells and milk production in mammary epithelial cells (MEC) by indeterminate pathway[33] Sufficient milk production is very important for baby growth, because breast milk is the best food for babies.

Postnatal care ingredients are expected to accelerate wound healing due to the birth process. Some plants that have wound healing properties are cinnamon (*Cinnamomum zeylanicum*) , eucalyptus (*Melaleuca leucadendra*), fenugreek (*Trigonella foenum-graecum*), neem (*Azadirachta indica*), *Aegle marmelos*, garlic (*Allium sativum*), *Curcuma domestica*, *Morinda citrifolia*, *Centella asiatica* [35-39]where all of these plants can be found in Madura herbs for postnatal care.

Rules for the use of herbs in postnatal care

Postnatal care given to mothers after giving birth in Madurese tribe in Bangkalan includes massage, the use of herbs, as well as certain food and activities restrictions. Specifically, the use of herbs is divided into 2 groups, consisting of potions taken orally and external use. For potions taken orally carried out in sequence with different herbs from time to time up to 40 days. Meanwhile, the formulas used externally are applied to the lower and upper body, face and to be washed in the vagina.

The Madurese community use multi-herbal recipes. There were 13 kinds of concoctions for postnatal care delivered by informants. The sequence of potion use begins with rubbing body with a mixture of ash, tamarind (*Tamarindus indica*), and salt (Table 1). Not all herbs were used by mothers after childbirth for 40 day treatment. There were differences between informants regarding the types of postnatal concoctions and their respective compositions. For variations in plant composition, it is possible for these practitioners to adapt to plants around herbal makers or as family ingredients passed down from previous generations, which differ from one another.

Bu abu herb consists of purple ginger (*Zingiber cassumunar*) and tamarind (*Tamarindus indica*), while in the ***sa'ang sereh*** herb there are black pepper (*Piper nigrum*) and *Piper betel*. Plants contained in ***Pejje*** herb some of them are *Curcuma xanthorrhiza*, *Litsea odorifera*, *Trigonella foenum-graecum*, *Pimpinella anisum*, *Foeniculum vulgare*, *Alyxia reinwardtii*, *Helicteres isora*, *Coriandrum sativum*, *Elaeocarpus grandiflorus*, *Zingiber officinale*, *Cinnamomum sintok*, *Curcuma domestica*, *Zingiber purpureum*, *Rauvolvia serpentina*, and *Allium sativum*. ***Ronronan*** is polyherbal which consists of *Plucea indica*, *Carica papaya*, *Paederia foetida*, *Andrographis paniculata*, *Elephantopus scaber*, *Vitex trifolia*, *Sauropus androgynus*, *Phyllanthus niruri*, *Tamarindus indica*, *Premna foetida*, and *Psidium guajava*. On the eleventh day, they drank the bangkes potion which consists of *Curcuma aeruginosa*, *Baeckea frutescen*, *Amomum cardamomum*, *Zingiber officinale*, *Zingiber zerumbet*, *Boesenbergia pandurata*, *Piper nigrum*, *Trigonella foenum-graecum*, *Curcuma domestica*, *Usnea barbata*, *Curcuma xanthorrhiza*, *Carum copticum*, *Sindora sumatrana*, *Massoia aromatica*, *Piper cubeba*, and *Eucalyptus alba*. Furthermore, on the 21st day, the mothers drank the ***galian parem*** concoction which is a mixture of *Kampferia galanga*, *Pimpinella anisum*, *Curcuma xanthorrhiza*, *Zingiber zerumbet*, *Piper nigrum*, *Alpinia galanga*, *Foeniculum vulgare*, *Syzygium aromaticum*, *Myristica fragrans*, and *Zingiber zerumbet*. ***Pakak*** potion which is taken on the 31st to the 40th day consists of a mixture *Quercus infectoria*, *Kaempferia rotunda*, *Zingiber officinale*, *Boesenbergia pandurata*, *Saussurea lappa*, *Areca catechu*, *Trigonella foenum-graecum*, *Terminalia chebula*, *Punica granatum*, *Parameria laevigata*, *Ligusticum acutilobum*, *Foeniculum vulgare*, *Alyxia reinwardtii*, *Kampferia galanga*, *Citrus histrix*, *Carum copticum*, *Piper cubeba*, and *Terminalia bellirica*. On the night of 40th day, they drank ***tel buntel*** herb consisting of *Quercus infectoria* Oliv., *Boesenbergia pandurata* Roxb., and *Punica granatum* L. For 40 days they are not allowed to drink cold water, especially at night. If they want to drink, they should drink *aeng jamo* which is mixed stew from *Pimpinella anisum*, *Curcuma domestica*, *Curcuma xanthorrhiza*, *Curcuma aeruginosa*, and *Cinnamomum zeilanicum*.

For external care, mothers rub the body parts with ***upper parem***, ***baba parem***, and ***peles*** as well as ***lakela*** to wash the vagina. In the ***upper parem*** concoction, there are *Saussurea lappa*, *Rheum officinale*, *Santalum album*, *Syzygium aromaticum*, *Nictanthes arbo-tristis*, *Terminalia bellirica*, *Citrus histrix*, *Ligusticum acutilobum*, *Cananga odorata*, and *Oryza sativa*. Meanwhile, the ***lower parem*** is a herb with the composition of *Piper cubeba*, *Zingiber zerumbet*, *Massoia aromatica*, *Kampferia galanga*, *Myristica fragrans*, *Syzygium aromaticum*, *Zingiber officinale*, *Piper retrofractum*, and *Alpinia galanga*. ***Peles*** is a mixture that is rubbed on the forehead which is formulated from *Syzygium aromaticum*, *Acorus calamus*, *Amomum cardamomum*, *Zingiber officinale*, *Kampferia galanga*, *Zingiber zerumbet*, and *Curcuma heyneana*. The last herb is ***lakela***, a potion for washing the birth canal which is decoction from *Piper betle*, *Curcuma domestica*, *Curcuma aeruginosa*, and *Curcuma xanthorrhiza*.

Tabel 1. Rules for the use of herbs in postnatal care for 40 days

	The use of potions	Benefits
First day	Rubbing the mother's body with a mixture of tomang (kitchen) ash, tamarind, and salt Drinking bu abu herb (decoction) Sitting on a coconut shell that has been heated	Making blood circulation smooth, reducing pain in the stomach and vagina, reducing swelling
Day 1-3	Drinking jamoe sa'ang sereh (decoction)	Reducing aches, cleaning dirty blood from the uterus, treating inflammation
Day 4-10	Drinking pejje or ronronan herbal medicine (decoction or powder)	Smoothing the breast milk, shedding dirty blood, relieving stomach pain and nausea, providing nutrition for mother and baby
Day 11-20	Drinking Bangkes potion (powder)	Bangkes: cleaning the remnants of dirty blood, restoring sagging muscles, restoring energy
Day 21-30	Drinking galian parem herbal medicine (powder)	Cleansing the white blood, restoring the stomach to become slim,
Day 31-40	Drinking pakak herbal medicine (powder)	Tightening the vagina, eliminating odors, eliminating excessive mucus, making faces brighter and younger
The night of 40th day	Tel buntel herbal medicine. (decoction)	Closing and eliminating vaginal discharge and strengthening vaginal muscles, as an aphrodisiac
For 40 days	Using bengkong (a length of cloth measuring 20 cm x 10-15 m) Using baba/lower parem, upper parem, and peles (ointment) Using lakela for splashes (decoction) Drinking aeng jamo herbal medicine (decoction)	Bengkong: making stomach not loose, quickly becoming slim Baba parem: reducing aches in the muscles of the feet and hands, warming up, preventing varicose veins Upper parem: reducing aches in the back, relieving pain in the chest and back area Lakella: preventing infection of the birth canal and accelerating wound healing Peles: reducing heat and dizziness in the head, refreshing the eyes and preventing white blood from rising to the head, so that the face is fresh and not pale Aeng jamo is taken for 40 days so the baby does not catch colds easily, the body is fresher

Application of herbal medicine in the form of powder was done by brewing with a dose of one tablespoon powder with warm water, stirring until well blended. Honey, brown sugar, lime juice or vinegar was usually added to remove the bitter taste. Some non-plant materials were often added in the use of herbal medicine, namely honey, egg, brown sugar, rock sugar, salt, kitchen ash, yeast, Madura vinegar made from toddy palm water (*Borassus flabellifer* L.). and *landana batok*, a coconut shell soaking water which is made by burning coconut shell and then added water until the ash settles.

Apart from the use of herbal medicine, massage is always done by the mother after giving birth, usually done on the 1st day, the 11th day, then on the 25th day, and the 40th day after giving birth. Massage for the mother after giving birth is done by a traditioanl birth attendant or massage shaman in charge of massaging and bathing the baby, including making herbal medicine. Massage serves to stimulate blood circulation so as to speed up the return of body fitness.

The restriction for mothers after giving birth applies to several traditions in many regions of the world [40-42].

For Madurese people in Bangkalan is also the same. For example, for 40 days mothers who give birth should not eat pineapple because it can cause itching for themselves and their babies. If a mother wants to eat bananas she has to boil them. Forbidden to eat catfish and squid because it will make the baby weak. Mother also has to sleep while sitting, legs straightened and not allowed to hang.

At present midwives have commonly involved in childbirth in the villages. In general, the cooperation between midwives and traditional birth attendance in Bangkalan was quite good. Midwives still allow mothers to take herbal medicine after the medicine from the midwife runs out, which is after 7 days, although many patients continue to take herbal medicine from day one by giving a pause 1 or 2 hours after taking conventional medicine. The midwife also advises mothers not to drink herbal medicine with their pulp, which is only to take the upper liquid after the brewed herbs are saturated so as not to harm the kidneys. The combination of traditional treatments that have been done for years combined with modern scientific health services will improve the degree of public health better.

Conclusion

The use of herbal medicine after giving birth is still a necessity for many women in Madura espesially in rural area. Drinking jamu for the Madurese community aims to accelerate the healing process after childbirth and restore the body. There were differences in the use of the types of herbs and the composition of plants used between one family and another, traditional healers, and between traditional birth attendants depending on the knowledge passed on by the elders in each family and also the existence of a plant in the particular area.

The integration between modern health services and the preservation of local traditions in postpartum care must be maintained by all parties. Moreover, Madura as a region in Indonesia is famous for its culture of drinking herbal medicine. Further research on pharmacological mechanisms, efficacy, side effects and toxicity needs to be done.

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