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The scientification of *jamu*: a study of Indonesian's traditional medicine

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Abstract. Various species of medicinal plants in Indonesia commonly used by residents as herbal medicine. Indigenous knowledge of herbal medicine has never been scientifically researched, whether it is related to the benefits, the technology of manufacture, the effort of obtaining qualified herbs, and the compound components in medicinal plants. The purpose of this study was to document information and saintification about ethnomedicine in Semarang City, Central Java, Indonesia. This is a qualitative study, with data collection techniques through field studies to the research sites to gather information from traditional drug makers through semi-structured interviews and field observations. The data obtained is further analyzed to obtain a scientific explanation. The focus of this research is the type of traditional herbal products, how to make herbs, composition making, and how to produce the best herbal medicine based on information from traditional medicine maker. Two types of traditional herbal medicine are analyzed. Each type of traditional herbal medicine is described from the aspect of benefits, the main compound, the way of making, the creative idea aspect to produce the best herbal medicine, and the best material composition.

1. Introduction

Since ancient times, human health problems have been a concern. This can be seen from the use of plants and animals as a source of traditional medicines which are depicted in temples, books and inscriptions [1]. In addition to Indonesia, Indigenous Science for medicinal plants for centuries has been known to the Chinese, Indian, Brazilian people, Ethiopia is integrated in many aspects of culture [2]. Until now, the tradition of drinking traditional medicine is still very popular in several Asian countries, Latin America, and Africa including Indonesia and India [3].

The Javanese people in particular and the Indonesian people in general, have long used medicinal plants as a deterrent, inhibitor, and to diseases found in the body by drinking herbs derived from medicinal plants. The indigenous knowledge of the efficacy of various medicinal plants is an ancestral heritage that is still proven to be useful, and is safe based on empirical evidence [4, 5]. Various species of medicinal plants as the basic ingredients of traditional medicine are widely grown in Indonesia, especially various plants of *empon-empon* or herbs and spices in traditional Javanese medicinal ingredients.

Traditional Indonesian herbal medicine that has been practiced for centuries in Indonesian society is still very popular for maintaining health and treating diseases, because it is more believed to be safe from chemical drugs. This traditional medicine is generally known as *jamu* [6]. In the past, some even survived until now, the peddlers of this herbal medicine went around in a region by carrying the herbs they were selling, so that they were often called *jamugendong*. The existence of advances in



transportation technology, making most sellers peddle their wares with cart, ride a bike or opens their outlet somewhere. However, the term *jamugendong* is still inherent in the minds of the people to name the traditional medicine sold as a whole.

The knowledge of traditional *jamu* formulas preserved and transmitted down orally from one generation to another. This is in accordance with the definition of traditional medicine delivered by the World Health Organization (WHO), namely "a number of knowledge, skills and practices based on indigenous beliefs and experiences, whether explained or not, used in health care, and in prevention, diagnosis, improvement or treatment of physical and mental illness".

Traditional medicinal plants are very important as preparation for curative and protective drugs [7,8]. Utilization of medicinal plants that grow on community land as part of the procurement of traditional medicinal materials has been carried out by the community since ancient times [6]. In Javanese society in particular, various traditional medicines made from natural spices have been used by ancestors, prepared as assistance in the Borobudur Temple which is concerned with processing / making herbal medicine. Various spices and *empon* as a form of Javanese local wisdom are usually referred to as herbal medicine, among others, *jamukunir asem*, *jamu beras kencur*, *jamu paitan*, *jamu godhongkates*, *jamucabepuyang*, and *jamutemulawak*. The names of these herbs are the main components in the herbal ingredients, such as *jamukunirasem*, then the components are turmeric and tamarind. In the *jamuberaskencur*, the supporting components are rice and kaempferiagalanga. In addition to the main components, some herbalist may added various ingredients to complement the desired benefits. For example, in *jamuberaskencur*, aside from two basic ingredients, namely rice and kaempferiagalanga, they added it with *kawak* acid, *kedawung* seeds, ginger rhizome, cardamom seeds, *temukunci*, cinnamon, turmeric, lemon and nutmeg.

The observations found that the ingredients used to make the herbs came from nature without synthetic chemicals, so that the herbs can be consumed regularly and there are relatively no side effects [5]. The taste of the ingredients also varies depending on the ingredients used. Some are bitter, sour, sweet and fresh. To reduce bitter taste, added natural sweeteners such as brown sugar, granulated sugar, rock sugar or honey. The people's belief in the reliability of herbal medicine based on empirical facts that are believed to be true is further investigated to determine the content of bioactive compounds contained in the main ingredients used so as to produce a concoction of traditional medicines that are safe and efficacious for the body [4].

Thus, based on the diversity and composition of ethnomedicine and how to mixtraditional medicines from traditional herbalist and vendors around Gunungpati, Semarang City, Central Java, Indonesia, thispresent studyaims to analyze the traditional medicine formulated and sold by traditional medicine vendors.

2. Methods

This study uses a qualitative approach. This approach was chosen with consideration in order to understand more deeply about indigenous knowledge about the types of local plants that have medicinal properties traditional medicines. In accordance with the focus of the study, the research subjects were sellers of herbal medicine, namely sellers and traditional medicine makers who peddled their fairs around in Gunungpati District, Semarang City, Central Java. Gunungpati District is a sub-district located in the southern part of Semarang City. The total area of 5,399,085 ha is divided into 16 urban villages, 93 RW and 472 RT. The technique of collecting data through observation of active participation, followed by in-depth interviews, field observations and literature studies on traditional medicine ingredients and their benefits. The informant selection technique in this study used purposive sampling technique. Each traditional medicine maker involved in this study was informed about the purpose of the survey, and each informant participated in the study with full agreement.

During the research study, each respondent was visited three times to verify the reliability of the data obtained. Repeated visits also helped collect additional information not mentioned during the previous interview. Interviews in the context of extracting and sharpening information on the original knowledge of traditional medicine maker carried out at the place of manufacture of traditional

medicine. Data collected from the results of observations and interviews with respondents, then verified, reduced for data that does not contain scientific concepts, carried out saintification of scientific knowledge of the community using relevant literature.

3. Results and Discussion

In this study, observation and interviews were conducted on 5(five) sellers who were also traditional *jamu* makers in Gunungpati District, Semarang City, Central of Java. The vendors and makers of the *jamu* have conveyed knowledge related to the knowledge, methods of making, and the efficacy of the traditional medicines they make.

The results of observations and interviews with the five vendors and sellers of traditional medicine obtained information that the techniques, methods and methods of using traditional medicines are still the same as how the ancestors used them. The sellers of the jars carry their watches in liquid form to be sold immediately. Although the actual way of using traditional medicine is various ways, such as by brewing medicinal ingredients with hot water, boiling ingredients to boiling, smoothing the ingredients to be distributed on the body surface or made as *tapel* (attached to certain body parts), but the five respondents only peddling herbal in the form of liquid stew from various medicinal ingredients. All herbs produced are recommended for drinking immediately. The results of the identification of the types of traditional herbal medicine produced by the five sellers of herbal medicine are listed in Table 1.

Table 1. Herbs produced by *jamu* makers

Traditional medicine of	Medicine makers				
	Responden	Responden	Responden	Responden	Responden
	1	2	3	4	5
<i>Paitan</i>	✓	✓	✓	✓	✓
<i>Beraskencur</i>	✓	✓	✓	✓	✓
<i>KunirAsem</i>	✓	✓	✓	✓	✓
<i>Godhongkates</i>	✓	✓	-	✓	✓
<i>Temulawak</i>	✓	✓	✓	✓	✓
<i>Kuncisuruh</i>	-	-	✓	-	✓
<i>Gulaasem</i>	✓	✓	✓	✓	✓
<i>Cabepuyang</i>	-	✓	-	-	-

The results showed that there were five types of traditional medicines which were commonly formulated by traditional medicine sellers, namely (1) *beraskencur*, (2) *kunirasem*, (3) *paitan*, (4) *gulaasem* (tamarind sugar), (5) *temulawak*. While other types of herbal medicine, the sellers deliver only if there is a demand.

The types of ingredients added by each respondent to the five types of herbs sold are very varied and this knowledge is also a habit they get from their parents or ancestors. In Table 2, several types of ingredients are presented by respondents for the eight types of herbs.

Table 2. Medicinal plants to each type of traditional drugs

Tradisional drugs	Main Materials and others Materials
<i>JamuPaitan</i>	The raw material for <i>paitan</i> herbal medicine is <i>sambiloto</i> , but there are also other ingredients that add bitter taste such as <i>brotowali</i> , <i>widorolaut</i> , <i>doroputih</i> , <i>babakan pule</i> , <i>adas</i> and or <i>empon-empon</i> (rhizome ingredients used in spices).
<i>JamuBeraskencur</i>	The raw material for <i>kencur</i> rice is rice and <i>kencur</i> . Other ingredients that are usually mixed are <i>kedawung</i> , ginger, <i>kapulogo</i> , <i>kawak</i> acid, <i>temukunci</i> , <i>keningar</i> wood, turmeric, lime, and nutmeg. As a sweetener used brown sugar and white sugar
<i>JamuKunirAsem</i>	The raw material for tamarind turmeric is turmeric and tamarind, sometimes it is mixed with <i>sinom</i> (young tamarind leaves), ginger, <i>kedawung</i> , and lime. As a sweetener used brown sugar mixed with white sugar and salt
<i>JamuGodhongkates</i>	The raw material for herbal medicine <i>godhongkates</i> is papaya leaves [9], but some herbal makers add <i>temuireng</i> [10], <i>adaspulowaras</i> , and salt
<i>JamuTemulawak</i>	The raw material for <i>temulawak</i> herbal medicine is ginger rhizome, often added with <i>kencur</i> , seedless <i>asemkawak</i> , palm sugar, fresh <i>pandan</i> leaves, and cumin.
<i>JamuKuncisuruh</i>	The raw material for <i>jamukuncisuruh</i> is <i>temukunci</i> rhizome and betel leaf. Usually <i>kawak</i> acid is added. Some <i>jamu</i> sellers add other ingredients commonly used in concoction of whitish herbal medicine such as pomegranates, areca nuts, <i>pepet</i> , <i>majakan</i> , <i>jambe</i> , cinnamon, <i>beluntas</i> , and <i>kencur</i> . As a sweetener used sugar and brown sugar and salt
<i>Gulaasem</i>	The tamarind sugar is commonly used to reduce the bitter taste of herbal medicine or as an antidote to the bitter taste after consuming herbs. The raw material for tamarind sugar is tamarind, boiled water, brown sugar and salt
<i>JamuCabepuyang</i>	The main ingredients of the herbal medicine for <i>cabelempuyang</i> are chili and <i>lempuyang</i> , added with other ingredients such as <i>temuireng</i> , <i>temulawak</i> , ginger, <i>kudu</i> , <i>adas</i> , <i>pulosari</i> , turmeric, pepper, <i>kedawung</i> , <i>keningar</i> , tamarind, and <i>temukunci</i> . As a sweetener used brown sugar, white sugar and salt

According to respondents, variations in the types of medicinal plants used in each herb from parents or habits carried out by their ancestors. Respondents only know that certain types of herbal medicine can treat certain diseases based on beliefs and empirical experiences that have been proven since ancient times. In general, traditional medicine makers and vendors did not know the reason why traditional medicines with herbal ingredients such as turmeric, ginger, and *kencur* which are formulated have various properties for human health. The herbal medicine makers never know why a medicinal plant can have certain efficacy. They only do the work as is the custom that has been done by the previous generation.

The results of the scientific certification of indigenous knowledge related to the making of traditional *Paitan* and *KunirAsem* traditional medicines are presented in Table 3.

Table 3. Description of the Scientific Analysis of Community Knowledge on Traditional Medicine.

No	Types of Traditional Medicine and Its Benefits	The Scientific Analysis
	Indigenous Science	
1	<p>Traditional medicine <i>Paitan</i></p> <p>Traditional medicinal <i>paitan</i> is considered as the most bitter traditional medicine</p> <p>Interviewees of makers and seller of traditional medicine <i>paitan</i> convey the benefits of traditional medicine bitter is for various health problems, such as dialysis / itching remover, <i>biduran</i>, appetite enhancer, diabetes, body odor, lower cholesterol, abdominal bloating / acne, aches, and dizziness.</p> <p><i>Andrographispaniculata</i> boiling water is often called traditional female health recipe because the main ingredient that is used are <i>andrographispaniculata</i> leaf which has anti-infection and anti-inflammatory effects. Benefits of boiled water</p> <p><i>Andrographispaniculata</i> leaf for women is to treat vaginal discharge as well as overcome the cold, reduce fever and flu.</p>	<p>The basic ingredients of traditional medicine <i>paitan</i> is <i>Andrographis Paniculata</i>. But there are also other materials such as <i>Tinosporacrispa</i>, <i>Zizophusmauritiana</i>, <i>doroputih</i>, <i>Alstoniascholaris</i>, fennel and rhizome cooking seasoning).</p> <p>Scientific analysis of the bitter taste of the traditional medicine, due to the presence of alkaloids secondary metabolite compounds that have a bitter taste, for alkaloids plants as antitoxin.</p> <p>According to traditional drug sellers, boiling the ingredients of traditional medicines still use <i>kwali</i> / kettle from clay, because it will not eliminate the efficacy in traditional herbs. Technique to mash ethno-medicine by not using metal tools, but using <i>alu</i> from wood or stone.</p> <p>In order for traditional medicine to be more nutritious, in the process of manufacture, try to dry all ingredients that will be boiled, so that the sap that is on the plant does not inhibit the absorption process in the body.</p> <p>Scientific science Traditional medicine sellers are creative to maintain the efficacy of traditional medicine .</p> <p>The interviewees conveyed information that traditionally 'the composition of traditional drug making materials of all aspects (the type of material, how to prepare, the dosage and the time and manner of use) must correspond to the hereditary heritage from our ancestors.</p> <p>Deviation from one aspect of the possibility may cause the ingredients of the traditional Medicines that are safe to be safe or harmful to health.</p>
2	<p>Traditional medicine <i>KunirAsam</i></p> <p>Traditional Turmeric acid medicine by traditional drug sellers is referred to as traditional medicine '<i>adem-ademan</i> or <i>seger-segeran</i>' which can be interpreted as a traditional medicine to refresh the body or can make the body become cold, to avoid the heat or canker sores, making the belly cold. And to quicken menstruation.</p>	<p>Main ingredients: acidic fruit plus turmeric, sometimes there are mixed with <i>sinom</i> (young acid leaves), <i>temulawak</i>, <i>kedawung</i>, and lemon juice. Brown sugar mixed with white sugar and a little salt are used as a sweetener.</p> <p>Making traditional medicine bitter is by boiling all the ingredients with water, until the cooking water left about half. This method is intended for all nutritious substances contained in the material can dissolve into boiling water (extraction process).The stew has a very bitter taste, and the creative idea of traditional medicine makers to reduce the bitterness is consumers are given other traditional medicine that has a sweet and fresh taste like <i>sinom</i>, <i>beraskencuror kunirasam</i></p> <p>The concept of Science that emerged techniques of isolation, extraction, separation and purification of secondary metabolite substances, the concept of solution and colloids.</p>

Some studies show that turmeric, ginger, quail, *kencur* contain the main compounds called curcumin with the molecular formula $C_{21}H_{20}O_6$ ($M_r = 368$) with polyphenol structures that have been clinically tested to cure inflammatory diseases or protect the skin from inflammation / red spots, improve stamina by increasing the activity of estrogen and estrogen hormones, and antioxidants and the risk of heart disease by neutralizing free radicals, saturated fatty acids and increasing the activity of antioxidant enzymes the body has, anticancer by suppressing cancer growth, development and distribution at the molecular and antimicrobial levels [11, 5].

The herbal ingredients used by the respondents are all from plant parts in the form of fresh and dry *simplicia*, starting from the roots, rhizomes, stems, leaves, flowers and fruit, not just the extraction or isolation of the active ingredients [12]. Potions use traditional doses. The beginning of herbal medicine is known as *jamugodog* for boiling fresh and dry *simplicia*. There are also those that are brewed with hot water for *simplicia* from flowers and leaves. Of the various materials commonly used by respondents in making their herbal ingredients, there are several ingredients that have been clinically tested namely greetings, bitter herbs, turmeric, red ginger, Dutch teak, ginger, guava, and Java chili [11, 13]

4. Conclusion

The results of the study show that herbal medicines with various health benefits have been formulated by sellers of herbal medicines in the city of Semarang. There are 5 types of herbs that are popular among the people, namely *jamupaitan*, *jamukunirasem*, *jamuberaskencur*, *jamutemulawak*, and *sugar asem*. The scientific results of each type of herbal medicine find the main types of compounds in herbal medicine, herbal functions for the health of the human body, and traditional equipment used in the manufacture of herbs. In addition to the main ingredients used as medicine, there are ingredients added to herbal ingredients such as *kedawung* seeds, cumin, *pandan* leaves, lemongrass, lime, cinnamon and ginger. As a sweetener used in Javanese sugar.

Making ginger herbs with the addition of ginger, tamarind, palm sugar, *pandan* leaves and cumin, both for children and the elderly because it can cure complaints of dizziness, nausea, and relieve symptoms of colds. Of all types of traditional herbal medicine, *paitan* herbs are the most difficult to enjoy, because they are made of *Tinosporacordifolia*. But properties such as relieving pain, eliminating swelling, anti-inflammatory, and overcoming arthritis make many people continue to consume bitter herbs.

JamuCabaiLempuyang made from *lempuyang* and chilli java. This herbal drink can overcome fatigue and stiffness, prevent colds, increase energy, reduce flatulence, etc. *JamuKunyitAsam* is one of the most popular types of herbs, made from turmeric and acid. The properties of this herb are lowering blood pressure, menstrual pain in women, and overcoming constipation. *JamuBerasKencur* is a herb that is believed to eliminate stiffness in the body. By drinking this herb, the body will avoid the aches and pains that usually arise after working too hard. In addition, there are many opinions that this herb can stimulate appetite, so that appetite increases and the body becomes healthier.

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