THE KNOWLEDGE OF LOMBOK PRAYA-INDONESIA REGIONAL COMMUNITY ON THE SAFETY USE OF MEDICINAL PLANTS

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Abstract: The use of medicinal plants to maintain or overcome health problems has long been carried out by worldwide community. *Along with the development of knowledge, data about the existence of undesirable effects or side effects associated with the use of medicinal plants that are not appropriate are obtained. This research is conducted to determine public knowledge about the safety several medicinal plants use. The study was conducted with a questionnaire technique in Lombok Praya, Indonesia. The results show that knowledge about the safety of the use of medicinal plants in breastfeeding mothers obtains the correct answer by 48%, knowledge about the parts of medicinal plants that are dangerous for consumption by 39% and knowledge about medicinal plants that can increase health risks by 21%. Whereas, the knowledges for the use of medicinal plants in pregnant women and the use of medicinal plants that are not right obtains very good results with correct answers of 79% and 81%. Based on further interviews, these good results are obtained because they are supported more by traditional use of the plant that has already existed in the area. Public understanding of the safety of some medicinal plants in Lombok Praya is still lacking. It is necessary to add knowledge about the use of medicinal plants that requires special attention, especially on plants that are often used by people in the area. Local health agencies need to disseminate information on the safety of medicinal plants that is wider and more sustainable.*

Keywords: *Community, medicinal plant, safety, public understanding.*

INTRODUCTION

The use of medicinal plants to maintain or overcome health problems has long been carried out by Indonesian people. The legacy of the ancestor known as *Jamu*, continues to be preserved and used today. As science advances, research on medicinal plants has increased quite rapidly. In addition to information on pharmacological property that is scientifically proven, another information that develops is the discovery that there are compounds contained in plants that have a detrimental effect on humans under certain conditions. Until now, the world community in general that functions medicinal plants believe that using medicinal plants will always be safer than conventional medicine. However, with the development of knowledge, data obtained show that there are undesirable effects or side effects associated with the use of medicinal plants that are not appropriate.[1] Some undesirable effects, for example, are harmful to pregnant women and breastfeeding mothers, are not for internal use, can increase health risks.[2]

For this reason, this research will examine public understanding of the use of medicinal plants that need special attention because of the content of the compounds they have which can cause harmful effects to humans.

Until now, knowledge about medicinal plants in the community is more focused on aspects of the benefits or efficacy. Information about the adverse effects that must be considered by the public is not conveyed even many people do not know. For this reason, survey is needed to determine people understanding of this matter, so that adverse effects that are harmful to health can be prevented and can maximize the desired treatment properties. In addition, the results of this study are hoped to be used by authorized health agencies to design policies relating to medicinal plants.

This research will be conducted in the Praya Lombok area. Praya is a sub-district in Central Lombok district, West Nusa Tenggara, Indonesia. The capital of Central Lombok Regency is located between 115°46 – 119°05 East Longitude and 08°10 – 09°05 South Latitude. Lombok district area is known to have Sasak tribe as a native tribe from West Nusa Tenggara, in which its traditions and customs are still preserved, including its medical treatment. Thus, until now the use of traditional medicine is still very entrenched in the area of Lombok which of course is largely colored by the customs of the Sasak tribe.[3] This research will focus on medicinal plants that are often used by people in certain conditions. These conditions include the use of medicinal plants in pregnant women and breastfeeding mothers, parts of plants used, how to use, and what conditions are not allowed.

RESEACRH METHOD

The research design used was a non-experimental research design and was descriptive in nature. In this study, a questionnaire was used as a medium to obtain information in the form of data. This research was limited to only being carried out in Lombok Praya, West Nusa Tenggara-Indonesia in July 2019. Demographic physiognomies of the informants were determined and documented through face-to face conversations. Research using that questionnaire was conducted on women in Lombok Praya area, Indonesia, with as many as 62 people with ages of ≥ 30 years old.

RESULTS AND DISCUSSION

All respondents were given a questionnaire containing questions about plants with their respective criteria and choice of answers. Plants given in each criterion were plants that were commonly used in traditional ingredients of Lombok community.

Table 1. Distribution of respondents based on community age

Age group (year)	Total	Percentage (%)
≤ 30	0	0.0
31-40	15	24.2
41-50	36	58.1
51-60	10	16.1
≥ 61	1	1.6
Total	62	100

Table 2. Distribution of respondents based on community education in Lombok Praya in 2019

Highest education	Total	Percentage (%)
High school/equivalent	24	38.7
Diploma I/II/III	4	6.4
Bachelor degree	28	45.2
Master degree	1	1.6
Others	5	8.1
Total	62	100

Based on Table 1, it can be seen that the distribution of the most respondents is in respondents aged 41-50 years (58.1%). This illustrates that the majority of traditional drug consumers in Lombok Praya area are adults. It is known that the older a person is, he or she will be wiser and has more experiences or things figured out and done.[4] However, from the level of education can be seen in Table 2, the majority of respondents have a good level of education, which is bachelor degree as much as 45.2%. This illustrates that from the level of education, the respondents adequately know and understand the use of traditional medicines.

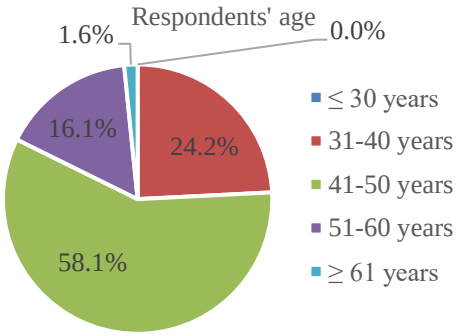

Figure 1. Percentage distribution of respondents based on age

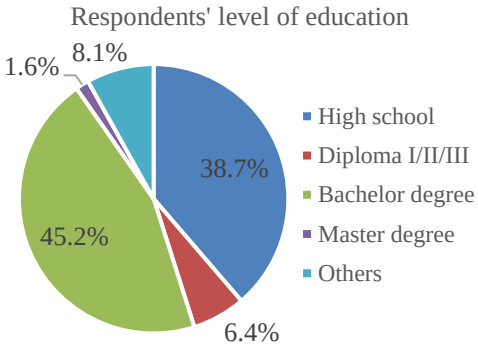

Figure 2. Percentage distribution of respondents based on level of education

Table. 3. Respondents' Answers on the Questionnaire Given

No.	Plant criteria	True (%)	False (%)
1.	Dangerous for pregnant women (fetus/baby)	79	21
2.	Dangerous for breastfeeding mothers	48	52
3.	Plant parts that are dangerous for consumption	39	61
4.	Improper use	81	19
5.	Increase health risks	21	79

The respondents are given a choice of four kinds of medicinal plants that they are familiar with and commonly consume namely papaya fruit (*Carica papaya*), onion bulb (*Allium cepa*), green tea (*Camellia sinensis*), and cucumber (*Cucumis sativus*). Then, respondents are required to choose medicinal plant that is dangerous to be

consumed for pregnant women because it is dangerous for the fetus or baby. As many as 79% of respondents give the correct answer that is green tea.

Consuming green tea is very beneficial for health, including to help overcome cancer, rheumatoid arthritis, high cholesterol level, cardiovascular disease, infection, and impaired immune function.[5] Green tea can also reduce body weight, as an anti-inflammatory for arthritis, reduce stress, has anticariogenic and preventive effects of ultraviolet-induced (UV-induced) skin carcinogenesis, and as a topical skin protector against UV radiation.[6]

Green tea is a plant that is considered dangerous if consumed too much by pregnant women. This is because it is related to the availability of folic acid for the fetus. Folic acid supplementation will significantly reduce the small risk of pregnancy and at birth.[7] Folic acid plays a key role in epigenetic regulation of fetal development programming.[8] The initial supplementation of folic acid is consistent with the role of folic acid recently in cognitive function and autism spectrum disorders (ASD) prevention.[9] Folic acid intake is 0–800 μg/day. The results show that the average daily intake of folic acid in excess of 600 μg compared to less than 600 μg during the first month of pregnancy is associated with a reduced risk of ASD.[10] Thus, folic acid deficiency in the fetus or baby can be a risk factor for birth defects and neural tube defects (anencephaly and spina bifida).[8] Several studies have shown that folic acid deficiency and/or imbalance in folic acid and vitamin B12 intake together with changes in folic acid or vitamin B12 in the blood during and at the end of pregnancy are associated with low birth weight, spontaneous abortion, placental abruption, and congenital abnormalities.[11,12]

Research shows that catechin, an antioxidant found in tea, can reduce the bioavailability of folic acid. Because the intake of periconception folic acid has been proven to reduce the risk of spina bifida, tea consumption can put pregnant women at risk because of the possibility of having antifolate properties. Among women with a total intake of folic acid of more than 400 μg, consumption of three or more cups of tea per day is associated with an increased risk of spina bifida.[13] Another result of study on healthy volunteers aims to investigate the possibility of pharmacokinetic interactions between tea and folic acid shows that average reductions of 0.4 mg of folic acid, green, and black tea of C_{max} of folate serum are 39.2% and 38.6%, and the average AUC $_{0 \rightarrow \infty}$ are respectively 26.6% and 17.9%. At a dose of 5mg of folic acid, average C_{max} of folate serum is reduced by 27.4% and the average AUC $_{0 \rightarrow \infty}$ is significantly reduced by 39.9% by the joint application of green tea. This result shows in vivo interaction between tea and folic acid with low concentration of green and black tea which results in decreased bioavailability of folic acid.[14] Therefore, consuming tea, especially green tea, can cause a decrease in the availability of folic acid for babies.

The survey results show that the respondents in Praya Lombok know that green tea is not good for pregnant women. However, further interview reveals that this good result is further supported by respondents' knowledge that green tea is widely used for weight loss,[6] so according to them it is definitely not good for pregnant women.

For plants that are harmful for breastfeeding mothers, respondents are given four kinds of plant choices, namely ginger rhizome (*Curcuma xanthorriza*), betel leaf (*Piper betel*), carrot (*Daucus carota*) and aloe vera leaves (*Aloe vera*). The survey results state that only 48% of respondents give the correct answer, that is aloe vera.

It is known that fresh *Aloe vera* leaf consists of about 98.5% water, and the rest

are various compounds, including nutrients.[15] It also contains 12 different types of anthraquinone, namely aloin, isobarbaloin, anthracene, emodin, ester of cinnamonic acid, chrysophanic acid, barbaloin, anthranol, aloetic acid, aloe emodin, ethereal oil, and resistannol[16] and also various acids and compounds.[17]

Aloe vera has many health benefits. People are very familiar with functioning this plant to maintain health. The benefits of *Aloe vera* include wound healing, protective effect against radiation damage to the skin, anti-inflammatory, effects on the immune system, laxatives, antivirus, antitumor, moisturizer, anti-aging, and antiseptics. Clinical use based on scientific evidence is for seborrheic dermatitis, psoriasis vulgaris, genital herpes, skin burns, diabetes (type 2), HIV infection, cancer prevention, and ulcerative colitis.[18,19] Several implementations based on traditional use are for alopecia, bacterial and fungal skin infections, chronic foot injuries, parasitic infections, systemic lupus erythematosus, arthritis and tic douloureux.[18] About 23 polypeptides exist in aloe juice help controlling the broad spectrum of diseases and disorders of the immune system. Polypeptides plus anti-tumor agents, aloe emodin, and aloe lectins are now also used in the treatment of cancer.[20]

However, *Aloe vera* is included in plants that are dangerous for breastfeeding mothers. This is because the anthraquinone glycoside constituent compound from aloe vera leaf juice will be secreted into breast milk.[21] It is known from the results of the experiment Aloe-emodin-9-anthrone (AE-anthrone) that the decomposition product of barbaloin produced in the rat large intestine causes not only an increase in intestinal water level but also stimulating mucus secretion, which may play an important role in the occurrence of diarrhea.[22] Therefore, consumption of aloe vera (aloe and aloin) should be avoided during breastfeeding. A case in which two days old baby has reported to experience severe diarrhea and dehydration and lose 10-16% of body weight after consuming breast milk. It is known that the baby's mother has consumed 2 Liter of Aloe Vera King® (OKF Corporation, Seoul, Korea) during pregnancy and breastfeeding.[23]

The survey results show that 52% of Lombok Praya respondents do not yet know that *Aloe vera* cannot be consumed by breastfeeding mothers. This shows that there needs to be an increase in community knowledge regarding to the consumption of Aloe *vera* in nursing mothers.

In this survey, bitter melon fruit (*Momordica charantia*) is selected as the example of the presence of dangerous parts of plants for consumption, because bitter melon has long been used traditionally to treat diabetes. The respondents are given four kinds of choices of bitter melon, namely the fruit, seeds, roots, and flowers. The survey results mention only 39% of respondents give the correct answer, namely the seed.

Bitter melon fruit has many health benefits, such as hypoglycemic, antiviral, and antineoplastic. Moreover, it can also be functioned for psoriasis, infertility, gastrointestinal cramp, infection, abortifacient, wound healing, antimicrobial, anticancer, and immunomodulator.[24,25] Bitter melon fruit is also consumed as food and is found as an ingredient in several South Asian curry dishes.[24] Fruit extracts have also been shown to have activity in fighting *Helicobacter pylori*, which can cause stomach ulcers.[26] However, its seeds are different.

It is known that bitter melon seeds contain twenty-five compounds identified in *M. charantia* seed oil amounting to 90.9% of total oil. The main compound is sesquiterpenes (71.7%), phenylpropanoids (11.0%), and monoterpenes (7.6%), trans nerolidol becomes the main constituent (61.6%).[27] It also contains β-sitosterol-β-D-

glucoside and other compounds.[28] The results show that two basic glycoproteins isolated from *M. charantia* seed, which are α- and β-momorcharin, are proven effective in inducing early and medium term (post-implantation) of abortion in mice.[29-31] An in vivo study towards Wistar male rats shows that 400-800 mg/kg/day of *M. charantia* (bitter melon) seed ethanol extract causes infertility, which is associated with direct toxic effects on the seminiferous tubules and epididymis, as well as the reduction in seminal and plasma testosterone levels that may significantly impact sperm motility, spermatozoa life, normal morphology of spermatozoa, and the activity of the acrosome membrane.[28]

In a clinical case, it has been reported that aryl red around bitter melon seeds has produced toxicity; vomiting, diarrhea, and death in a child have been reported.[32] There are other reports of children aged three and four who need immediate medical attention after swallowing *M. charantia* leaf water extracts and vines. In both cases, the Sorrosi tea (cerasee) has been given by their mother early in the morning before another food is consumed. Between 1-2 hours after consumption, children experience seizures followed by coma. Blood glucose is in the region of 1 mM (normal range 3.8-5.5 mM). Both patients recover after getting treatment.[33]

The survey results show that as many as 61% of respondents in Lombok Praya do not yet know that bitter melon seeds are dangerous for consumption. This shows that there needs to be an increase in public knowledge about the use of hazardous plant parts for consumption even though the other parts are indeed very beneficial for health, in this case especially the use of bitter melon fruit without involving the seeds.

To find out respondents' knowledge about inappropriate use of traditional medicines that can cause harmful effects, respondents are given four kinds of plant choices, namely celery (*Apium graviolens*), amethyst (*Datura stramonium*), ginger (*Zingiber officinale*), and *sambiloto* (*Andrographis paniculata*). Respondents are told to choose medicinal plant that is consumed not as a drinkable medicine, but for external use. The survey results state that 81% of respondents give the correct answer, namely amethyst.

It is known in amethyst plants that the main active ingredients in this plant are atropine alkaloid and scopolamine.[34] As a matter of fact, sixty-four tropane alkaloids have been detected from *D. stramonium*[35] besides other compounds.[36] Although it is reported that the use of this plant in small amounts has health benefits,[37,38] but it is more recommended for external use because traditionally it is also more widely used for external use and has been proven scientifically.[35,39-42]

The use of amethyst plant that is used traditionally is more recommended for use on external use rather than internal use. This is supported by various research results including Diker[43] which state that consuming any part of this plant can cause severe anticholinergic reactions which can cause poisoning. *D. stramonium* contains various alkaloids which can cause anticholinergic poisoning if consumed in large concentration[44] This statement is supported by Kurzbaum[45] which state that all parts of the *D. stramonium* plant are toxic because of the high level of tropane alkaloids.

In a clinical case, there is even a report of a 6-year-old boy who is diagnosed with anticholinergic poisoning.[46] Another unusual case of acute *D. stramonium* poisoning in a 3-year-old girl who experiences toxic delirium an hour after swallowing *D. stramonium* plant leaves. This plant poisoning is characterized mainly by toxic delirium which occurs quickly after consumption.[47]

Survey results show that 81% of respondents in Lombok Praya have already known that *D. stramonium* plant should be used for external use and not for consumption. After further observation, this turns out to be because this plant has long been traditionally used in Lombok for external use,[3] so people are accustomed to using this plant for external use.

For medicinal plants that can increase health risks by increasing the occurrence of bleeding, respondents are given four kinds of plant choices namely garlic (*Allium sativum*), noni (*Morinda citrifolia*), turmeric (*Curcuma domestica*), and aloe vera (*Aloe vera*). The survey results show that only 21% of the respondents give the correct answer, which is garlic.

It is known that garlic has many benefits for human health. Research that has been conducted, among others, states that garlic has a pharmacological effect on diabetic nephropathy, antibacterial, spermatogenesis, neurological abnormalities, coagulation, and blood pressure. Active against cardiovascular disease, chemo preventive cancer (colorectal cancer, prostate cancer, breast cancer, stomach cancer, oral cancer, liver cancer, leukemia, and anticancer toxicity), hepatotoxicity, cardioprotective (antihypertensive, anti-atherosclerosis, antithrombotic, antithrombotic, and lipid-lowering), hepatotoxicity, cardioprotective (antihypertensive, anti-atherosclerosis, antithrombotic, and lipid-lowering), antimicrobial, antiprotozoal, antifungal, and antivirus.[48-50]

The content of compounds presents in garlic bulbs include essential oils which are dominated by compounds containing sulfur, especially allyl polysulfides, diallyl disulfide, and diallyl trisulfide.[51] Garlic contains about 65% water, 28% carbohydrates (fructans), 2.3% organosulfur compounds, 2% protein (allinase), 1.2% free amino acids (arginine), and 1.5% fiber, and also contains active compounds like allicin, diallyl disulphide, diallyl sulphide, diallyl trisulfide, vinyldithiins, ajoenes, and S-allyl-$_{L.}$-cysteine.[48,52]

The results show that garlic extract is able to increase fibrinolysis activity compared to controls, with an increase in the time needed for blood clotting.[53] Garlic (*Alllium sativum* L.) can also increase the pharmacological effects of anticoagulants such as warfarin or fluindione.[54] The antiplatelet effect of garlic is manifested as a reduction in the adhesion of platelets against collagen, and fibrinogen as a reduction in platelet aggregation in response to epinephrine.[55] Based on the results of the study above, the consumption of garlic in certain cases can increase the risk of bleeding.

In a clinical case, it is reported that a 55-year-old man who undergoes by-off bypass surgery and experiences diffusion and bruising after surgery. The hematological profile is normal before surgery and the patient has not used antiplatelet for a week before surgery. Based on a known investigation, the patient has been consuming dietary supplements containing fish oil and garlic, where both are known to affect the function of platelets. This requires the surgeon and anesthesiologist to screen all patients before surgery for possible intake of any food supplements taken by the patients.[56]

The survey results show that 79% of respondents in Lombok Praya are not aware of the effect of increasing the risk of bleeding due to consuming garlic. For this reason, there is a need for socialization to reduce the consumption of garlic, especially as traditional medicine for patients who will undergo surgical operations.

CONCLUSION

Public understanding of the safety of some medicinal plants in Lombok Praya is still lacking. It is necessary to increase

knowledge about the safety of using medicinal plants that are often used by the community. Local health agencies need to disseminate information on the safety of medicinal plants that is wider and more sustainable. Thus, it is hoped that the public will benefit from the use of medicinal plants to the maximum and undesirable effects or side effects associated with the use of medicinal plants that are not properly eliminated.

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