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Ethnomedicine Study on *Justicia gendarussa* for Male Contraception at the Nimboran Ethnic, Jayapura

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Abstract

Background: *Justicia gendarussa* from Papua has traditionally been used for the treatment of several diseases, and phytochemical studies have been carried out since 1987. **Objective:** This study aimed to determine the use of this plant as a male contraceptive that the Nimboran Ethnic and their perspectives have long used. **Method:** A qualitative method with an ethnographic approach was used, while data were collected through interviews, observations, and documentation. The informants were selected using purposive and snowball sampling. **Result:** The results showed that 44% of people use it to delay pregnancy, 24% due to young marriage with poor economic conditions, 14% after moving to another place 12% because of tribal wars over fertile land to multiply offspring. The preparation and usage of this plant through the collection, mixing, and manufacturing method and in terms of dosage, time, and duration of use were explored more deeply by conducting interviews with 50 informants. The effectiveness and success as a method of contraception are presented in the way the community has known the plant over different generations, and this method is still used as an alternative option considering the very wide area profile from one place to another. **Conclusion:** *Justicia gendarussa* is used by the Nimboran Ethnic group as an ingredient in traditional medicines, especially for male contraception.

Keywords: *Justicia gendarussa*, ethnomedicine, male contraceptive, medicine, nimboran ethnic

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INTRODUCTION

Indonesia is a developing country with the fourth highest population globally; hence, to overcome the high rate of increase in the inhabitants, the government promotes a Family Planning program. This program is carried out to help individuals or married couples avoid undesired births, obtain the desired delivery, set pregnancy intervals, and determine the number of children in a family (BKKBN Provinsi Papua, 2015; Sulistyawati, 2013). Data from the Indonesian Demographic and Health Survey (IDHS) 2002 - 2003 showed that the females practising contraception were 98.7%, while the males that were only 1.3% later reached 1.81% in 2014 (Kemenkes, 2014). The use of modern methods among married women has the same percentage from 2002 to 2017 of IDHS (57%-58%). Meanwhile, traditional methods tend to increase from 2002 to 2017 (Kemenkes, 2018). The standard methods of male contraception are interrupted intercourse (coitus interruptus/withdrawal), condoms, and vasectomy (male sterilization). Furthermore, they have weaknesses, including less effectiveness (4 – 24%), psychological resistance, a high failure rate (3 – 15%), and possible causation of prostate cancer despite being reversible (Prajogo, 2017). Therefore, the development of male contraception and increasing participation are needed to support the achievement of Family Planning programs in Indonesia, improve maternal health, and combat HIV/AIDS and other sexually transmitted diseases.

Justicia gendarussa (Gandarusa) is usually used by Nimboran District for several diseases therapy, one of them as a male antifertility. Their phytochemical studies have been carried out since 1987. Gandarusa has 12 flavonoids with the main component of gendarusin A (6,8-di- α -L-arabinopyranosyl-4',5,7-trihydroxyflavone) which is a compound that exerts hyaluronidase enzyme inhibitory activity on the acrosome head of spermatozoa during fertilization (Prajogo, 2002). This plant also contains potassium, flavonoids, justicin, steroids or triterpenoids, 0.4% tannins, alkaloids, aromatic amines, iridoids, and coumarins (Prajogo, 2002). It tends to be consumed by humans provided pharmaceutical quality, and clinical trials' requirements are met while being developed for the traditional medicine industry. The pharmaceutical quality guarantees that the desired efficacious substance (gendarusin A) has been sufficiently absorbed and the systemic circulation is reached to cause clinical effects (Prajogo *et al.*, 2011).

The use of gandarusa by the Papuan people is local wisdom that has been practised for a long time and needs to be explored in-depth and preserved. Local wisdom

from ethnic groups who inhabit a certain area utilizes natural materials in the form of plants, animals, and minerals around them to support their lives and survival. The utilization varies depending on the place of residence, ethnicity, indigenous beliefs, relationships to other community groups, and religion (Swerdlow, 2003; Atakpama *et al.*, 2012; Atato *et al.*, 2010; Avocevou-Ayisso *et al.*, 2012; Ayantunde *et al.*, 2008).

As described above, the early history of gandarusa usage in the Papuan community needs to be provided. This study was expected to provide new information and knowledge on the use of gandarusa for male contraception while preserving the cultural heritage of medicinal plants through ethnomedicine study. This study is a branch of medical anthropology that discusses the origin of disease, causes, and treatment methods according to certain groups of people. The ethnomedicine aspect is an aspect that appears along with the development of human culture. In medical anthropology, ethnomedicine gives rise to various terminology (Foster, 1986; Bhasin, 2007; Daval, 2009).

MATERIALS AND METHODS

Study design

In this study, a qualitative method with an ethnographic approach was used. Gandarusa from Nimboran District, Papua Province, was determined or identified at the Purwodadi Botanical Gardens, and plant specimens were stored in the Natural Product Drug Discovery and Development-Research Group (NPD3-RG). Then, data was collected through observations, interviews, and documentation (Nina & Lisa, 1996; Taek *et al.*, 2019). The informants were selected using purposive and snowball sampling.

Location and Time

This study was performed for eight months (September 2020 – May 2021) in the Nimboran District and its surroundings with a radius of 54 km. These district is a large area and was divided into 12 villages that village are Gemebs, Kuwase, Menyu, Kaitemun, Benyom, Tabri, Singgriway, Kuipon, Pobaim, Kuwase, Oyengsi, dan Imsar (BKKBN Provinsi Papua, 2015; Kopeuw, 2017; Moeso & Agus, 1985).

Data analysis

The data were analyzed descriptively and presented in a tabular form.

RESULTS AND DISCUSSION

The community that has used gandarusa over different generations and knows information about this plant was approached as the informant. The inclusion

criteria were as follows: (1) the indigenous people of the Nimboran Ethnic, (2) males aged 35 to 55 years, (3) commonly used gandarusa, (4) have used gandarusa as male contraception, and (5) living within 12 villages in the Nimboran District/Sub-District. Meanwhile, the exclusion criteria were (1) immigrant communities living among the Nimboran Ethnic group, (2) lacking information on the usage of gandarusa, and (3) not familiar with the way to use gandarusa for male contraception. The informant selection started from official data obtained from the National Population and Family Planning Board, Statistic Indonesia, the local Health Service, the Regional Institute Research and Development, the district government regarding the results or publications of a similar study and the local community. Then, the following informants were recruited using the snowball sampling method (based on the information from previous informants). The number of informants was limited until the information reached the saturation point. So, the total informants in this study were 85 males. However, 35 males do not meet the requirements. The demographic profile of informants from the Nimboran District showed in Table 1.

Table 1. Demographic profile of the informants

Informant data	Demographic profile
Gender	Male
Age	35 - 55
Education level	Primary level Secondary level High education level
Language	Nimboran (local language)
Mastery	Nimboran and Indonesia
Main profession	Farmer and employee

The plant determination showed that *Justicia gendarussa* (gandarusa) from the Nimboran tribe has the following characteristics: usually grows wild in the forest, in the form of shrubs with a height of about 0.8 - 2 m, woody trunks, leaves have thorns & pinnate, purple

flowers, and tubular, and two-lipped. They have the same characteristics as references (Dalimartha, 2001; Prajogo, 2014; Depkes RI, 1995).

Frans is one of the informants from Genyem village said gandarusa has a local name as lelik or nukhu. Gandarusa is used widely by Nimboran Ethnics. This plant is waist-high adults with many branches, has been known by the previous seven generations and is often found in forests or yards. Based on interview results with informants from 12 villages, it was informed that 64% of them used gandarusa leaves to delay pregnancy, 22% of them applied gandarusa roots for treating bone pain and bruises and 14% of them used gandarusa stems for particular purposes such as spiritual strength and walking ability for children under five months old was faster (Figure 1).

In this study, interviews with 50 informants were conducted. About 44% of informants said gandarusa was used to delay pregnancy, 24% said it was used for young marriage, 14% said it was used after moving to a new loaction because the area was too far from medical personnel, and 12% was used during the tribal war Nimboran Ethnic’s previous generation, while the remaining (6%) said it was used for other purposes (Table 2). Actually, they don’t mind having a large family, but there was a conflict that forced them to relocate to a new location with good and rich land as well as access to water. Hence, the community frequently sought advice from traditional elders or healers to to resolve the issue.

Table 2. Used of gandarusa

Time to use <i>Gandarusa</i>	Informants
To delay pregnancy	22
Due to young marriage	12
After moving to another place	7
During tribal war	6
Other	3

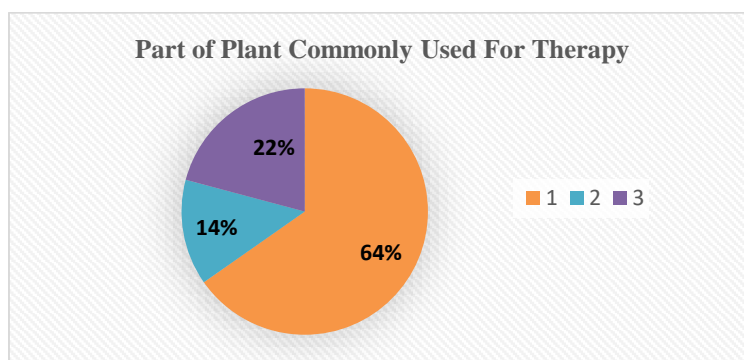


Figure 1. Part of plant commonly used for therapy; 1. leaves, 2. stem, 3. root

There was some information about gandarusa for male contraception, especially the number of leaves. Table 3 showed that the majority of informants used 10 pieces of leaves. Ingronang from Tabri Lekik Village used gandarusa leaf by picking ten pieces by themselves, then passed and boiling them with water. The water extract was offered to the husband and wife for delayed pregnancy, and this activity was performed for one year. The leaves are better to pick in the morning before the sun starts shining fully. It is called self-preparation.

Table 3. Pieces of Gandarusa leaf for male contraception

The number of leaves	Informants
10 pieces	16
15 pieces	13
17 pieces	8
8 pieces	6
16 pieces	4
18 pieces	2
12 pieces	1

According to WHO, gandarusa is a dangerous plant because it contains risk alkaloids. Therefore, this study carried out the side effects of gandarusa used daily by the Nimboran ethnic. The results are shown in Table 4. Based on interview data, most informants who used gandarusa leaves did not feel any side effects. Only 2% experienced side effects such as red eyes, decreased appetite, heartburn, drowsiness, throat disorders, bloating, dizziness, decreased libido, and dry mouth.

Table 4. Adverse effect of Gandarusa

Side Effect	Informants
No side effects	49
Side effects (red eyes, decreased appetite, heartburn, drowsiness, throat disorders, bloating, dizziness, decreased libido, and dry mouth)	1

Yacob one of the informants from Tabri Village said that Papuans fell health and illness from nature and things beyond human ability. Real limitations of healthy and sick persons are due to interference from a supernatural power or spirits, while others are related to nature, climate, water, soil, and human.

According to the IDHS, married females aged 15 - 49 on one type of modern contraception is relatively high, namely 61.5% in Papua and 92.7% in West Papua. Furthermore, 65.7% of the married females in Papua know about traditional contraception, while in West Papua, 43.6% used this method. High-level knowledge does not automatically lead to high coverage of family planning in the two provinces. According to the 2007

IDHS, Contraceptive Prevalence Rate (CPR) in Papua was only 24.5 %, and 37.5 % in West Papua, a very low coverage compared to the national level, which can also be seen from the high Total Fertility Rate (TFR) in the two provinces, namely 2.9 and 3.4 respectively. Unmet needs for contraception are still high at 15.8 % for Papua and 16.5 % for West Papua (BKKBN Provinsi Papua, 2017).

Efforts to control population growth are carried out through the Family Planning Program, which is characterized by changes in the number, structure, composition, and distribution of a balanced population following the carrying capacity and capacity of the environment. In Papua Province, there are 5 (five) traditional territories: (a) Anim Ha, which consists of 4 districts, namely Merauke, Asmat, Mappi, and Boven Digul; (b) La Pago consists of 6 districts, namely Mimika, Nabire, Paniai, Dogiyai, Deiyai, and Intan Jaya; (c) Mamta consists of 5 districts, namely Jayapura City, Jayapura, Keerom, Sarimi, and Mamberamo Raya; (d) Saireri consists of 4 districts, namely Biak Numfor, Yapen Islands, Waropen, and Supiori; (e) Mee Pago consists of 10 districts, namely Bintang Mountains, Jayawijaya, Lanny Jaya, Yahukimo, Tolikara, Yalimo, Nduga, Puncak Jaya, Central Mamberamo, and Peak (BKKBN Provinsi Papua, 2017; Moeso & Agus, 1985).

Since becoming part of the district/city government, the BKKBN can be placed in various agencies according to the local government needs and vice versa. Provided the officer does not come from the BKKBN, there is a tendency that the program will not develop according to needs. This change in institutional status affects the number and competence of staff in managing KB programs.

Traditional treatment methods are potentially analysed based on an in-depth understanding of the Papua culture. Therefore, traditional medicine from this province can be classified into six treatment patterns as follows (Enos, 2015; Kopeuw, 2017):

a. Amulet Treatment Pattern

Amulets are anything with magical powers, often plants that smell strong and are dark in color. This pattern is known in the Kepala Burung (Bird's Head) area, especially Meibrat and Aifat. According to Elmberg, the principle is to use substantial objects or amulets to protect against disease.

b. Possession Treatment Pattern

According to Van Longhem, a healer is often possessed while treating the patient. Hence, the dominance of supernatural powers in this treatment is very pronounced, as in the amulet type (Loghem, 1951).

This pattern is known in the bird's wing area, the Telik Arguni.

c. Blood Suction Treatment Pattern

This pattern is known in the ethnic living along the Tor River in the Sarmi, Marindanim, Kaimana, and Asmat areas. According to Oosterwal, the principle is that disease happens because of dirty blood, which when sucked, can lead to a curative effect (Oosterwal, 1962).

d. Trampling Treatment Pattern

According to Oosterwal, the principle is that disease occurs because the body is possessed by the spirit. Therefore, the evil spirit is released by trampling the patient's body, starting from two legs, then continuing until the head (Oosterwal, 1962). This pattern is known in the ethnic living along the Tor River in the Sarmi area.

e. Massage Treatment Pattern

This pattern is known in the ethnic living in the southern area of Merauke (Asmat) and south of Jayapura Regency (Towe). According to Van Amelsvoort, the principle is that disease occurs due to being possessed by the spirit and can be removed by massaging the whole body of patients (Amelsvoort, 2003).

f. Incense Treatment Pattern

This treatment is known in the ethnic living in the south of Jayapura bordering the Jayawijaya district, namely the Towe and Ubrub. The principle is that disease when the body is possessed by the spirit, causing the loss of a balance between the body and soul. The evil spirits and empirical causes of disease can be expelled with the steam from the concoction of heated leaves.

g. Elderly Prayer Treatment Pattern

People come to the traditional elders with several complaints and ask for prayers to cure diseases in the Namblong language. Then, elders informed medicinal plants to cure the disease and easily found in the yard or the surrounding forest. This treatment is known in the Nimboran Ethnic in Jayapura District.

Based on the concept of health and illness from the cultural perspective of the Papuan community, there are two categories based on their scope of life (Foster, 1986). The first category is health and sick as a supernatural event due to interference of supernatural power from humans. While the second category is health and sick as rationalistic due to interventions of nature, climate, water, soil, etc. and the community's behavior such as poor social relations, mental conditions, and others.

The Nimboran Ethnic group's method of processing medicinal plants into a potion is as follows:

a. Without Mixing (Direct Use).

This method directly uses plant parts without mixing or being processed in treating certain diseases. The leaves and stems are directly spread on the ground.

b. Mixture

1) Single form: mix the plant parts by pounding, then obtain the sap and put it on the sick area while the mixture is brewed and drunk immediately.

2) Compound form (mixture): this method involves adding certain mixtures into the initial preparation to provide a more potent/high-efficiency healing effect. The types and procedures for their use have been passed down down the generations and are recorded as traditional knowledge. The plant species such as vegetable pesticides are used to eradicate pests in their crops. The smell produced from the mixtures is powerful hence rats/pests do not dare to approach their crops, and the plant species for magical purposes is used as swangi medicine. Several species can be used to cure diseases, resurrect the dead, and defend against enemy attacks.

Based on the field observation in 12 villages in the Nimboran District, they used gandarussa to delay pregnancy 44%, due to young marriage with poor economic conditions 24%, after moving to another place 14% and due to the tribal war as 12%. There is 64% of this ethnic group used the leaves of gandarussa as a drink for their husbands to delay pregnancy. Then, 22 % used the roots to treat bone pain and bruises, and 14% used the stems to provide the power of special prayers. Hence children under five months tend to walk promptly.

Gandarussa leaves used to delay pregnancy were between 8 to 18 pieces. Up to 32% of the community used ten pieces of leaves, 26% used 15 pieces, 16% used 17 pieces, 12% used eight pieces, 8% used 16 pieces, 4% used 18 pieces, and 2% used 12 pieces. It was stated that the leaves used were old, and the plants were waist-high for adults. The Nimboran Tribe, Jayapura in Papua Province uses gandarussa with 10. waist-high leaves sheets by boiling water and drinking by men at night.

Out of the 50 informants, around 98% stated that there were no side effects felt while using gandarussa, where the time of use varied from 6 months to one year. The 2% remaining had side effects when consuming the plant, such as red eyes, decreased appetite, heartburn, drowsiness, throat disorders, bloating, dizziness, decreased libido, and dry mouth.

CONCLUSION

Gandarusa is used by the Nimboran Ethnic group in Jayapura, Papua Province, as an ingredient in traditional medicines, especially for male contraception. The preparation and usage of gandarusa through the collection, mixing, and manufacturing method and in terms of dosage, time, and duration of use were explored more deeply by conducting interviews with 50 informants spread over 12 villages. Gandarusa as a traditional male contraceptive in the Nimboran Tribe, Jayapura in Papua Province, is very effective and successful. The community's knowledge of the gendarussa plant and continued usage of it as an alternative remedy in a wide range of areas demonstrates its success and usefulness as a contraceptive strategy in this tribe.

AUTHOR CONTRIBUTIONS

Conceptualization, B.P.E.W.; Methodology, B.P.E.W.; Validation, B.P.E.W.; Investigation, N.I.; Resources, P.K.; Data Curation, R.W.; Writing - Original Draft, N.I.; Writing - Review & Editing, R.W., B.P.E.W.; Visualization, N.I.; Supervision, R.W., B.P.E.W.; Funding Acquisition, N.I., B.P.E.W.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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