

Research Article

Linking Zoopharmacognocny with Ethnomedication, An Evidence Base from Sebangau National Park, Central Kalimantan Indonesia

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ABSTRACT

The ability of animal to perform self-medication has been studied decades, as well as their relationship with medication practices by communities. Long-term observation of Orangutans' behaviour (*Pongo pygmaeus wurmbii*), by communities surround Sebangau National Park, has suggested as their modes to today ethno-medication practice. The study was aimed to study the relationship of Orangutans self-medicate behavior with ethno-medication practice, in Sebangau area. The research was conducted in Punggualas, SNP, from 29 April to 03 October 2017. A number of 13 traditional healers (TH) from *Karuing* (n = 4), *Baun Bango* (n = 4), and *Jahanjang* (n = 5) have been interviewed. All plants are listed and photograph. Plants parts, and their mechanism of utilization were also kept for record. Meanwhile, the behavior followed the Orangutan protocol, with focus on their feeding behavior. All data were analyzed descriptively, while the relationship was analyzed using chi-square and F test. We have recorded a total 131 plants at various life forms, in *Baun Bango* (n = 59), *Jahanjang* (n = 41), and *Karuing* (n = 21). Plants that were found similar among three villages, removed, were only 95 left. We observed one female, showing the ability to perform self-mediation. It is characterized by selectively choosing young leaves of *Mezzetia* sp., pulp of the *Dyera lowii* and *Ilex cymosa*, and lastly chew the entire leaves of Belang Handipek. It suggests a form of prevention against fatigue conditions, and the combination of these three plants species assume to be relating to fitness. This study shows that there is a relationship between the plant part used by the traditional healer and the orang-utan ($\chi^2 = 43,887$; n = 115, df = 11, p-value = 0.0000), the relationship between the use of plant parts utilized by the traditional healer and orangutans ($\chi^2 = 15, 647$; n = 50, df = 8, p-value = 0.0000). Furthermore, there is a relationship between the practice of traditional healer treatment using plant parts and Orangutan ($F_{1, 113} = 230.158$; p-value = 0,000). The study urges to isolate secondary metabolites for further investigation, especially in terms of phyto-pharmacy.

Keywords: Zoopharmacognocny, ethno-medicine, *Pongo pygmaeus wurmbii*, Sebangau National Park

Introduction

Zoopharmacognocny is the ability of animals to perform self-medication. The basic premise of this terminology implies that animals make use of the secondary and/or non-nutritional components of plants to treat themselves [1]. Furthermore [2] reported that in general this method of self-medication is divided into two classes, namely prophylactic and therapeutic.

This capability has been well documented since 1987 in one of the great apes, the Chimpanzees [3, 4] and the other apes [5, 6, 7, 8]. Several studies related to these abilities in the bird taxa [9, 10, 11]. Hence, it is suggested that the behavior of Orangutans in performing self-medication are reflects the medication practice of communities surround Sebangau National Park been practice today.

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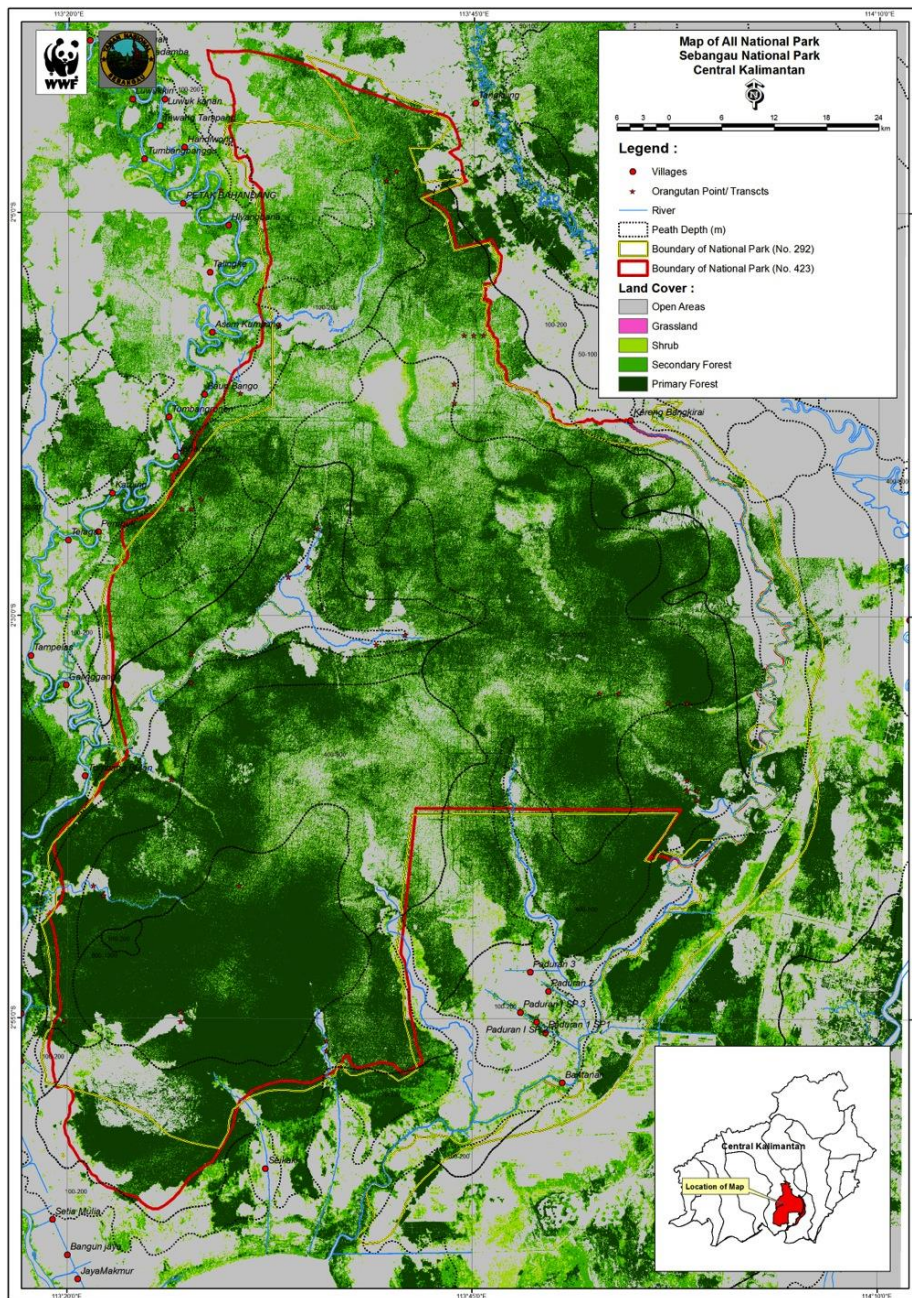


Figure 1. The map of Sebangau National Park, Central Kalimantan, Indonesia (Source: WWF-Indonesia, Central Kalimantan)

The term ethno-medication in many academic literatures has different meanings, such as causes of, diagnosis and treatment a disease as well as the level of health status. This, in turn provided ineffectiveness for reliable insight of relevant literature [12, 13]. Several studies have suggested the fact that there are similarities in the selection of plant parts by animals and humans. The use of soft plant tissue of *Vernonia amygdalina* Del. (Compositae) by Chimpanzees (*Pan troglodytes*) and

Mahale communities, Africa, to address complaints of nematode worms [2]. Furthermore, the same pattern reported for *Commelina* sp. (Commelinaceae) by Orangutan (*Pongo pygmaeus wurmbii*) and communities in Sebangau, Central Kalimantan [14]. Hence, we apply definition of ethno-medication [13] which is the practice or application of knowledge related to the field of study in medical word for a particular tribe/culture. The study was aimed to study the relationship among

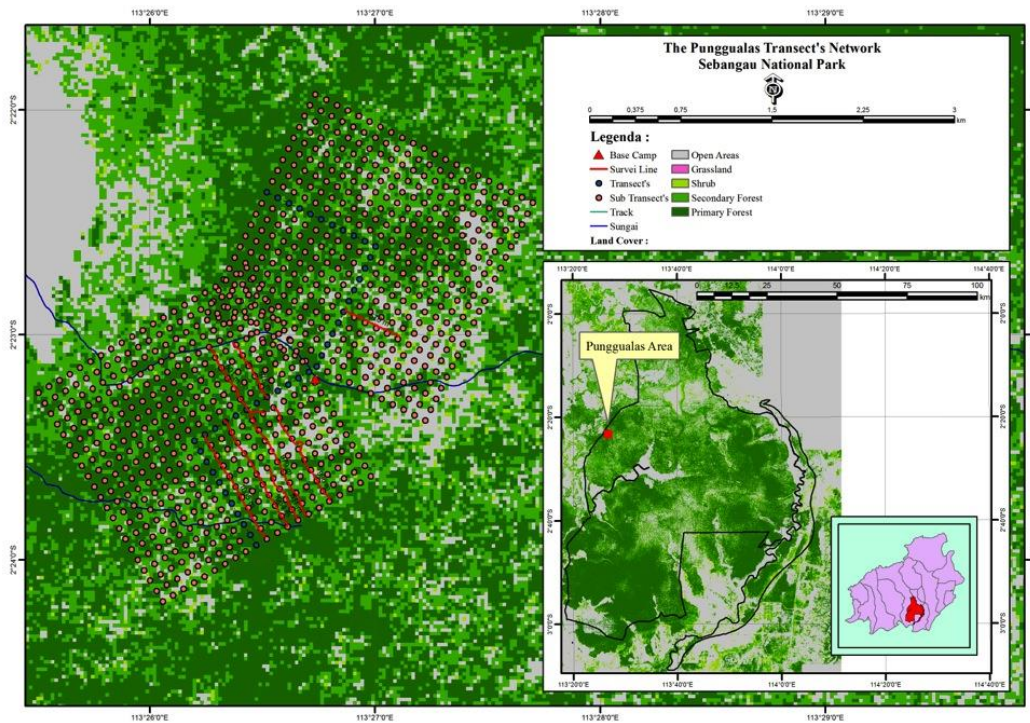


Figure 2. Transects network of Orangutan behavior observation, Punggualas Research Station (Source: WWF-Indonesia, Central Kalimantan)

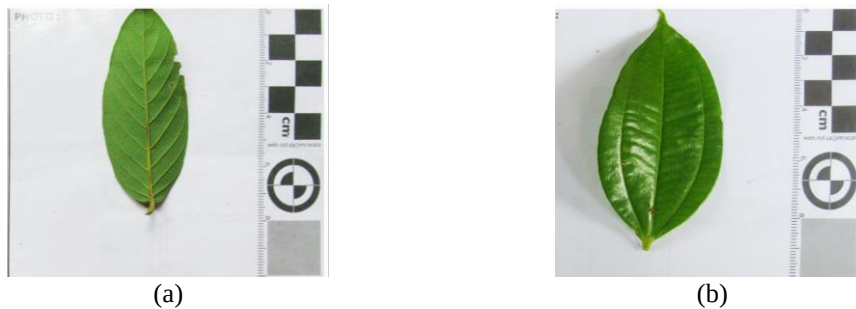


Figure 3. Leaves (a) *U. gambir* Roxb. and (b) *P. galeata* Ridl. (Sample collected from Baun bango village)

the utilization of plant parts used, utilized and forms of treatments by the Traditional Healer (TH) and Orangutan (*P. p. wurmbii*) in Sebangau National Park (SNP).

Material and Methods

Research is conduct using concurrent embedded method. Field data was collected from April 22 to October 3, 2017. There are two methods deploy, regarding the characteristic of the subjects, which are as follows:

Zoopharmacognosy of the orangutan (*P. p. Wurmbii*)

The observation of Orangutan behaviour was

carried out in Punggualas area, following Russon *et al.* (2008) [11]. It is located in the western site of Sebangau National Park (Figure 1). It is a wild-life research station, with their flagship species is Orangutan (*P. p. wurmbii*), which is managed by SNP in cooperation with WWF-Indonesia Central Kalimantan. The observations are using grid system. In Punggualas (Figure 2), there are four main transects, on which each having a length of 1,000 m. Within each main transect, we divided each 100 m, so that the intersection of each path, yields a grid of $100 \times 100 \text{ m}$ ($10,000 \text{ m}^2 = 1 \text{ Ha}$). Thus, the study area is $4 \times 100 \times 10,000 \text{ m}^2 = 4,000,000 \text{ m}^2$ (400 Ha). The team regularly travels through the main transect, looking for signs of orang-utan



Figure 4. Observed behavior of Orangutans feed on plant parts instead of natural diet (a and b) Orangutans bite stems *I. cymosa* stems - take a layer between the outer skin and the cambium; (c and d) Orangutans eat flowers of *S. macrophylla*

presence.

Ethnomedicine

In-depth interviews, as well as questionnaires were conducted in Baun Bango, Jahanjang and Karuing Villages, Katingan District. Among those villages, traditional healer (TH) – he or she, shall pass the inclusion criteria, as follow a) are confidently acquired knowledge from their descendant, pass to generations; b) the plants are collected surrounding SNP area, as well as indicate the location; c) demonstrate plant parts processing before hands.

Results and Discussion

The total plant species used by THs for their medication practices, within three villages was 131, whereas, Bango Village (n = 59), Jahanjang Village (n = 41) and Karuing (n = 21) respectively. Since we have found similar species among villages, same species will only be count as one. Thus, the total plant species studied were 95 species.

Meanwhile, during the observation, the Orangutan feed on 23 species of plants. The top four species have been recorded is *Kamasira* (*Ilex cymosa*), *Mahoni Baputi* (*Swietenia macrophylla*), *Bajakah Kalalawit* (*Uncaria gambir* Roxb), and *Kamasulan* (*Pternandra galeata* Ridl.). The two latter mentioned was the same on which Orangutan and THs, were incidentally, utilized (Figure 3 and 4).

Meanwhile, *bajakah kalalawit* (*U. gambir* Roxb.), TH believed to be a cure for internal medicine, by drinking its latex, while for the Orangutans there has been no explanation of the benefits of this plant. The *bajakah kalalawit* (*U. gambir* Roxb.) as another research reported that it has the phenolic contents and antibacterial properties of various extract [15]. Furthermore, a research suggested that this species, according to the detailed analysis, has an active compound so-called catechin [16]. It is a group occupies and intermediary position in the tannin hierarchy as ‘a family of catechin tannin’. While another research mentioned

Table 1. Ethno-medicinal use of *U. gambir* Roxb and *P. galeata* Ridl, in Baun Bango (BB), Karuing (KR) and Jahanjang (JHJ), Kamipang District, Katingang Regency Central Kalimantan Indonesia

Species name	Family	Sample from	Applications	Plant part	Remarks
<i>U. gambir</i> Roxb.	Rubiaceae	BB	Stem was cut, latex collected and drinks.	Latex	An illness (related to internist)
<i>P. galeata</i> Ridl.	Melastomaceae	BB	Root treat by pressed, mix with powder, apply to target area (suspect); some will treat by chewing	Roots	Tumor; haemorrhage
		KRG	Roots directly eaten, while leaves used sauna-like treatment	Roots; Leaves	Haemorrhage
		JHJ	Sauna-like treatment	Leaves	Haemorrhage

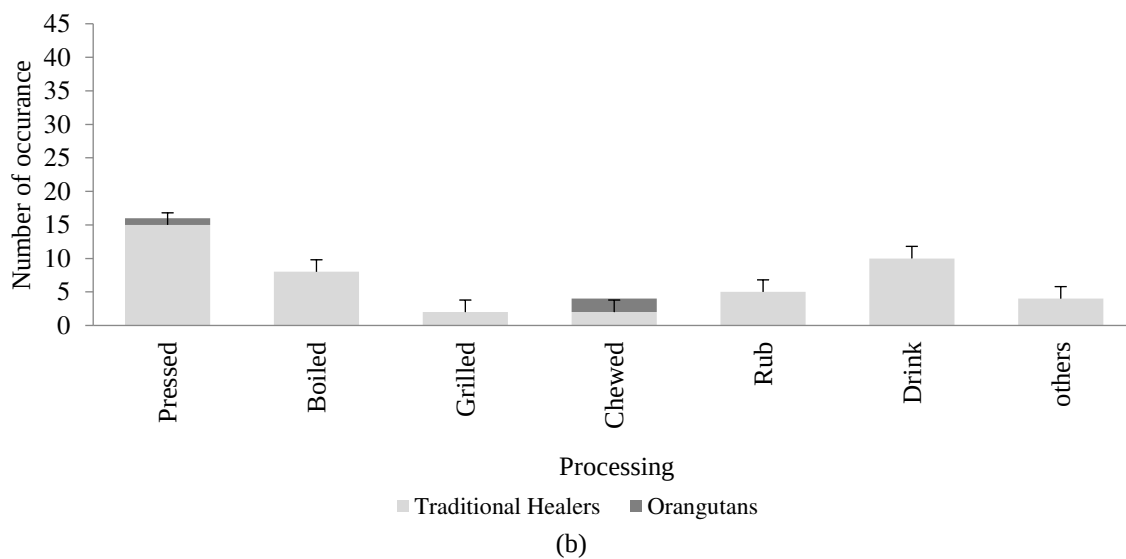
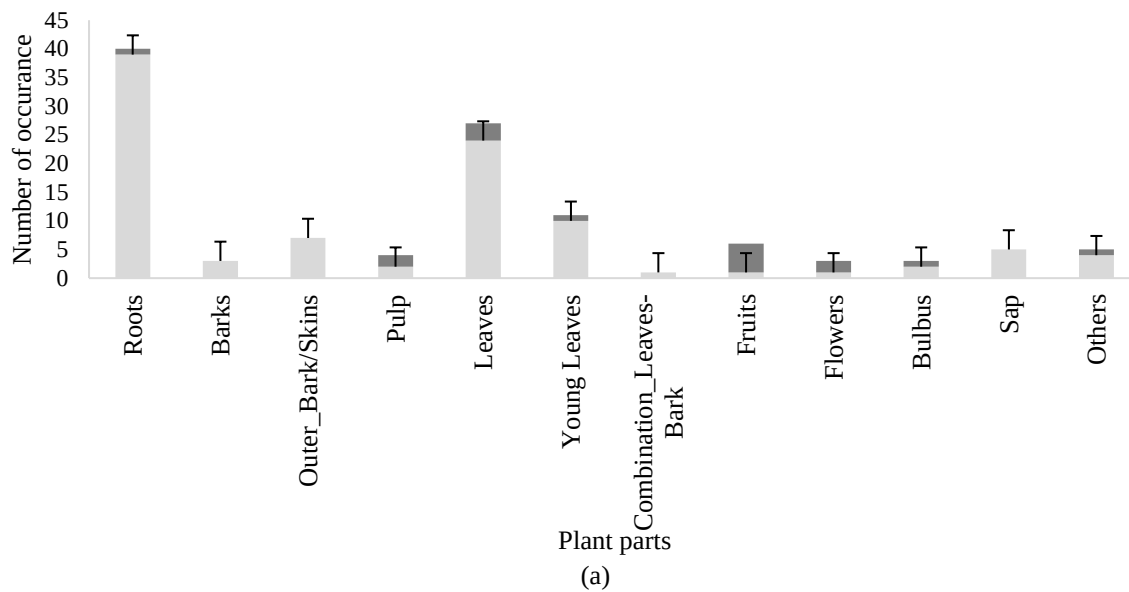


Figure 5. The comparisons on plant parts used (a) and utilized (b) between orangutans and traditional healers

that phenolic compounds have an astringency and reduce digestibility effect [3].

To test the relationship between the plant part and the mode of utilization, both by the TH and orangutans, one-way ANOVA and Chi-square tests were performed. Plant parts used by both of them are root, epidermis, leaf (including young leaves), fruits, and flowers respectably (Figure 5a). Correlation value for plant part used by TH and orangutans χ^2 43.887; $n = 115$, $df = 11$, p -value = 0.0000. In addition, there are several other non-plant parts for Orangutans i.e., termites. Although, this may reflect items at small quantities, as compares to concept of preference, this seems promising. The result indicates that non-nutritional parts are at stage, as a research pointed out that leaves and barks electivity values of the most-preferred species are orders of magnitude higher than for the least-preferred species [17].

Figure 5b have revealed some of the most prominent and show similarities associated with utilize is pressed and chewed plant parts, with $\chi^2 = 15.647$, $n = 50$, $df = 8$, p -value = 0.0000. Chewing process is thought to be the activation mechanism of a plant secondary metabolite compound involving the enzyme present in saliva [13].

One-way Anova shows that there is a correlation between medicinal treatment practice using plant part and Orangutan ($F_{(1, 113)} = 230,158$; $n = 114$; p -value = 0.000). This indicates that there is a secondary metabolite in the plant, which has a preventive and/or curative effect. We do concern about ethno-medication aspects as well as the nature of secondary metabolite pathway both in human and non-human primates. These findings lead to further investigation involving simultaneous and synergetic pattern with other compounds. Nevertheless, mechanism on which the metabolite trigger factor as well as its determine factor.

Conclusion

Based on the results of the data analysis, it can be concluded that there is a relationship between the utilization of plant parts, used ($\chi^2 = 43,887$; $n = 115$, $df = 11$, p -value = 0.0000), utilized ($\chi^2 = 15, 647$; $n = 50$, $df = 8$, p -value = 0.0000) and the treats to plant parts ($F = 230,158$; df error = 113; p -value = 0.000) by the Orangutan and traditional healers.

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