Ethnobotanical study and phytochemical screening of medicinal plants on Karonese people from North Sumatra, Indonesia

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Abstract. The Ethnobotanical Study and Phytochemical Screening of Medicinal Plants have been conducted on Karonese people from North Sumatra, Indonesia. The objective of this study was to explore and explain the relationship between anthropology and biology aspect through ethnobotanical study of medicinal plants using interview and participation observation method. Result showed that Karonese people had wide knowledge and close relationship with their plant resources especially medicinal plants. There were 181 species of medicinal plants in study area indicating that Karonese people had wide knowledge of using medicinal plants. Phytochemical screening showed that Bischofia javanica (cingkam) and Curcuma domestica (kaciwer) had secondary metabolite of alkaloids, terpenoids, flavonoids and saponins.

1. Introduction
One of the interaction between the community and its ecosystem is the wisdom of using plants in traditional medicine. Knowledge of the use of medicinal plants is based on the experience of previous generations derived from generation to generation [1] and has begun since the earliest days of social and human society [2]. The study of ethnobotany of medicinal plants aims to explore and document the knowledge and potential of medicinal plant resources of a society as well as its preservation and development efforts in the future [1,3,4].

Karo is one of the ethnic groups in North Sumatra, which has long been known to have expertise in traditional medicine and still held firm until now. This is evidenced by the number of traditional healers who are often found in the Karo community such as Tabib, Dukun Patah Pergendangan, Kem Kem, Dukun Beranak who can treat various diseases. This treatment uses plants both singly or in the form of compound plants showing there is a close relationship between the Karo community with plants, especially medicinal plants. Trading of medicinal plants by the Karo community in the traditional market of Kabanjahe has been around for 40 years [5].

The tropical forests of Sumatra stretches from the lowlands to the mountains containing megabiodiversity plants including medicinal plants. The vegetation composition changes with increasing altitude from lowland, upland to mountain forests. Karo people who inhabit from the lowland forest, upland to the mountains have different patterns of utilization of medicinal plants. So it can be assumed that Karo people have very rich dan wide knowledge of medicinal plants.
Massive destruction of Sumatra forests and rapid modernization will erode the wisdom of traditional medicine of Karonese and eventually disappear before it can be saved. The traditional agriculture of Karo community that has long practiced the shifting cultivation system led to change the structure and composition of vegetation from primary forest to secondary forest and loss of some species [6]. Therefore, to preserve and develop this valuable knowledge, it is necessary to conduct research that can reveal and document the wisdom of traditional medicine of Karo people and explain the relationship between biology and anthropology aspects through ethnobotany study of Karo people medicine plants. The aim of the study was to reveal, document and explain the traditional medicine of Karo people and the relationship between biological and anthropological aspects through ethnobotanical studies of Karo community medicine plants.

2. Materials and Methods
2.1. Study area
The study area is located in Simpang Empat and Kuta Buluh subdistricts in Karo Regency and Batang Serangan and Sei Bingei subdistrict in Langkat Regency (Fig.1).

2.2. Ethnobotanical survey
To explore information about the use of medicinal plants was used key informants such as traditional healers and people who had been their patients. Determination of key informants used snow ball method based on previous information from traditional healers and their patients. Ethnobotany data collection was done by in-depth interview and semi-structured method [7]. Then, field observations was conducted with the community as a guide to collect plant specimens based on information from key informants.

2.3. Phytochemical screening
The samples (roots, rhizomes, tubers, stems, leaves and flowers) were cut into small pieces and dried by wind for two weeks then pound into a smooth. Phytochemical screening of the sample extracts was performed to test for the presence of secondary metabolite including flavonoids, terpenoids, alkaloids and saponins. Phytochemical screening for alkaloids was determined using the Mayer, Dregendorff,
Wagner reagents. Terpenoids were determined by Lieberman-Burchard reagents, the flavonoids were determined using Mg powder. Saponin compounds are determined using aquades.

3. Results and Discussion

3.1. Sources of medicinal knowledge

The knowledge of Karo traditional medicine came from various sources. The main source of knowledge of traditional healers came from parents or their grandfathers who was derived from generation to generation. This knowledge was handed down limitedly to a selected person only in the family environment by oral tradition through stories. Traditional healers could also gain knowledge from dreams or occult whispers. Traditional healing practices of Karonese combines physical elements and metaphysical elements (spells). The knowledge of medicinal plants is believed to originate from supernatural spirits and powers. They must undergo certain rituals to prepare themselves physically and mentally in order to receive this knowledge. Other sources of knowledge came from personal experience, studying with others and exchanging information with other fellow healers. The geographical conditions and the distant settlements from health center caused most of the people still living in the inland village to use these traditional medicine to overcome their health problems. In addition, the inhabitants of the inland who worked as farmers generally live in the around the high diversity forest. The high level of knowledge in the use of medicinal plants also showed that there was still a strong relationship between the Karo community and the forests around them.

3.2. Species of medicinal plants

Based on the results of interviews with traditional healers, there were 181 species of medicinal plants belonging to 61 family used by the Karo community for treatment. These species of medicinal plants were high when compared with similar studies in other locations. The high knowledge in utilizing plants for treatment. The knowledge of traditional medicine is varied and dynamic according to the healer, disease level and the availability of plant material. The species of medicinal plants utilized by the Karo community in North Sumatra as medicinal plants can be seen in Table 1.

**Table 1. Species of medicinal plants in Karonese, North Sumatra**

| No. | Latin name               | Local name               | Used parts | Use                      |
|-----|--------------------------|--------------------------|------------|--------------------------|
| 1   | Achimenes grandiflora    | Barok-barok             | Leaf, flower | Ear inflammation         |
| 2   | Acorus calamus           | Jerango                  | Rhizome    | Postpartum               |
| 3   | Actinodaphne maingayi    | Medang                   | Leaf       | Itching in children      |
|     |                          |                          | Stem       | Anti mosquito            |
| 4   | Aeschynanthus parvifolia | Tawar aji                | Leaf       | Tuberculosis             |
| 5   | Albitza chinensis        | Karimbalang              | Leaf       | Gastritis                |
| 6   | Aleurites mollucana      | Kemiri                   | Seed       | Skin disease             |
| 7   | Allium cepa              | Bawang merah             | Bulb       | Cold, tumor, cancer, stroke, virility |
| 8   | Allium sativum           | Bawang putih             | Bulb       | Blood diluent, insomnia, tumor, cancer, stroke, virility, child immunity |
| 9   | Aloe vera                | Lidah buaya              | Leaf       | Hair fertilizer          |
| 10  | Alpinia striata          | Cekala kabang            | Root, leaf | Anti- snake poison, tuberculosis |
| 11  | Alseodaphne sp           | Kayu Sibarnaik           | Bark       | Sprue                    |
| 12  | Amaranthus ticololor     | Bayam utan               | Stem, leaf | Tonic                   |
| 13  | Andreea sp               | Sijergal                 | Leaf       | Drug paralysis           |
| 14  | Annona muricata          | Sirsak                   | Leaf       | Blood streamer           |
| 15  | Arachis hipogea          | Kacang tanah             | Seed       | Uric acid               |
| No. | Latin name               | Local name        | Used parts         | Use                                      |
|-----|--------------------------|-------------------|--------------------|------------------------------------------|
| 16. | Areca catechu            | Pinang            | Root               | Tumor, cancer                            |
| 17. | Arenga obtusifolia       | Ertok ndudur      | Shoot              | Tuberculosis                             |
| 18. | Arenga pinnata           | Aren              | Root               | Tumor, cancer, stroke                    |
| 19. | Argostemma involucratum  | Lancing           | Leaf               | Gastritis, fever, massage oil            |
|     |                          |                   | Kerangga           | Whole of part including dirty blood      |
| 20. | Argostemma subcrassum    | Patok - patok     | Leaf               | Diarrhea                                 |
| 21. | Artocarpus communis      | Sukun             | Leaf               | Blood streamer                           |
| 22. | Baccaraea lanceolata      | Rambe kura        | Leaf               | Diarrhea                                 |
| 23. | Bambusa sp               | Bambu             | Stem               | Stroke                                   |
| 24. | Bauhinia acuminata       | Takature          | Leaf               | Blood streamer                           |
| 25. | Benincasa hispida        | Labu manjang      | Seed               | Child immunity                           |
| 26. | Bischofia javanica       | Cingkam           | Bark               | Gastritis, diabetes, hepatitis A, hepatitis B |
| 27. | Boehmeria glomerulifera  | Perdit            | Fruit              | Headache                                 |
|     |                          |                   | Leaf               | Sprue                                    |
| 28. | Bouteloua sp             | Kambing bajar     | Tuber              | Sprue                                    |
| 29. | Caladium sp              | Birah             | Tuber              | Cancer                                   |
| 30. | Camellia sinensis        | Teh               | Leaf               | Virility                                 |
| 31. | Capsicum frutescens      | Cina              | Leaf               | Ear inflammation                         |
| 32. | Capsicum frutescens      | Cina              | Fruit              | Sprue                                    |
| 33. | Carica papaya            | Pepaya            | Leaf               | Blood streamer                           |
| 34. | Caryota sp               | Riman             | Root               | Tumor, cancer                            |
| 35. | Cassia alata             | Galinggang        | Leaf               | Skin fungus, allergy                     |
| 36. | Castanopsis costata      | Mias-mias         | Stem, bark         | Gastritis, eye drops                     |
| 37. | Ceiba pentandra          | Kapok             | Leaf               | Fever                                    |
| 38. | Celtis sp.               | Cang-cang duri    | Leaf               | Cold                                     |
| 39. | Centella asiatica        | Pegagan           | Root, leaf         | Cough                                    |
| 40. | Cinnmonum sp.            | Mambo             | Fruit              | Constipation, diarrhea                   |
| 41. | Citrus aurantifolia      | Jeruk nipsis      | Leaf               | Stroke, virility                         |
| 42. | Citrus hystrix           | Jeruk purut       | Fruit, leaf        | Insomnia, stroke, virility, allergy, epilepsy |
|     |                          |                   |                    |                                          |
| 43. | Citrus nobilis           | Jeruk puraga      | Leaf               | Stroke, virility                         |
| 44. | Citrus sp                | Jeruk citrusun    | Root               | Hepatitis B                              |
| 45. | Cladium sp               | Singkerbeng       | Leaf, flower       | Anthelmintic                             |
| 46. | Cocos nucifera           | Kelapa            | Root               | Tumor, cancer, Stroke                    |
| 47. | Coleus amboicus          | Terbangun hijau   | Leaf               | Cough                                    |
| 48. | Colocasia gigantea       | Birah             | Tuber              | Drug itching                             |
| 49. | Commersonia bartramia    | Bayur             | Bark               | Sprue                                    |
| 50. | Costus speciosus         | Tabar-tabar       | Root, leaf         | Sprue                                    |
|     |                          |                   | Leaf               | Cold, cough                              |
|     |                          |                   | Stem               | Eye drop                                 |
| 51. | Crassulaceae sp1         | Steram            | Leaf               | Tuberculosis                             |
| 52. | Cucumis sativus          | Mentimun          | Fruit              | Hypertension                             |
|     |                          |                   | Seed               | Child immunity                           |
| 53. | Cucurbita moschata       | Labu manis        | Fruit              | Diabetes                                 |
|     |                          |                   | Seed               | Child immunity                           |
| 54. | Curcuma domestica        | Kunyit            | Rhizome            | Postpartum, Tumor, cancer                |
|     |                          |                   |                    | Stroke, virility, Hepatitis A            |
| 55. | Curcuma sp               | Kuning gajah      | Rhizome            | Cancer                                   |
| No. | Latin name                  | Local name       | Used parts      | Use                      |
|-----|-----------------------------|------------------|-----------------|--------------------------|
| 56  | *Curcuma xanthorrhiza*      | Temu lawak       | Rhizome         | Spray medicine           |
| 57  | *Cyathea sp*                | Paku mawas       | Stem            | Fracture                 |
| 58  | *Cyclea laxiflora*          | Pupuk mulajadi   | Root, fruit     | Hepatitis                |
| 59  | *Cypopholus sp*             | Pega-pega        | Leaf            | Cancer                   |
| 60  | *Cystorchis aphylla*        | Wuruntulan       | Whole of part   | Fracture                 |
| 61  | *Dactyloctenium sp*         | Padang teguh     | Leaf            | Wound, cough             |
| 62  | *Daucus carota*             | Wortel           | Tuber           | Sprue                    |
| 63  | *Dendrophthoe sp*           | Steram           | Leaf            | Influenza                |
| 64  | *Durio grifithi*            | Terutung         | Leaf            | Accelerate the birth of a baby |
| 65  | *Durio malaccensis*         | Ndupar           | Leaf            | Medicinal scabies        |
| 66  | *Elaeocarpus petiolata*     | Lançung          | Root            | Sprue                    |
| 67  | *Elaeocarpus stipularis*    | Balunjok         | Bark            | Impotence drugs          |
| 68  | *Emilia Grandiflora*        | Calin cayoo      | Leaf            | Fever child              |
| 69  | *Endospermum malaccense*    | Daun buta - buta | Leaf           | Flatulence               |
| 70  | *Erechites hieracifolia*    | Trakakuda        | Leaf            | Impotence drugs          |
| 71  | *Eugenia grandis*           | Sereh kayu       | Leaf            | Cold                     |
| 72  | *Eugenia helferi*           | Kayu lawang      | Leaf            | Cold                     |
| 73  | *Eupatorium odoratum*       | Peseng           | Leaf            | Wound                    |
| 74  | *Euphorbiaceae sp1*         | Klemcem          | Shoot, root    | Cold, anti- snake poison |
| 75  | *Eurycoma longifolia*       | Tongkat ali      | Root            | Virility                 |
| 76  | *Ficus lepicarpa*           | Rube Manuk       | Flower          | Fever child              |
| 77  | *Ficus variegata*           | Rube sambah      | Bark            | Gastritis                |
| 78  | *Fissistigma latifolium*    | Dara - dara      | Leaf, bark      | Tonic                    |
| 79  | *Glicheinia linearis*       | Sempil-pilin     | Leaf            | Smallpox drug            |
| 80  | *Greenea corymbosa*         | Pucuk ring-ring  | Leaf            | Fracture                 |
| 81  | *Grewia acuminata*          | Tiga urat        | Leaf, root      | Virility                 |
| 82  | *Hamalomena nonandra*       | Langge           | Tuber           | Malaria                  |
| 83  | *Hedychium coronarium*      | Bunga encole     | Stem            | Eye drop                 |
| 84  | *Hibiscus rosasinensis*     | Bunga kembang    | Leaf            | Fever, measles, boil drug sepatu |
| 85  | *Hiptis capitata*           | Siberan          | Leaf            | Diarrhea                 |
| 86  | *Hoya diversifolia*         | Tawar kertas     | Leaf            | Tuberculosis             |
| 87  | *Hydrocotyle javanica*      | Garang gersing   | Leaf            | Influenza                |
| 88  | *Impatiens balsamina*       | Pacar air        | Leaf            | Fever                    |
| 89  | *Impatiens sp1*             | Bunga kiung      | Stem, leaf      | Fever child              |
| 90  | *Impatiens sp2*             | Bunga pancur     | Flower          | Tumor, servical cancer   |
| 91  |                             |                  | Leaf, flower    | Influenza                |
| 92  | *Impatiens sp3*             | Bunga sapa       | Flower          | Tumor, servical cancer   |
| 93  | *Imperata cylinrdrica*      | Rih              | Root            | Tumor, cancer            |
|     |                             |                  | Leaf            | Sore eye                 |
| 94  | *Indigofera suffruticos*    | Tellep           | Leaf            | Tonsillitis              |
| 95  | *Inguanura sp*              | Kempawa          | Leaf            | High fever of child      |
| 96  | *Ipomea batatas*            | Ubi jalar        | Leaf            | Boil drug                |
| 97  | *Justicia gandarusa*        | Sangka sempilet  | Root, leaf      | Diarrhea                 |
| 98  | *Justicia sp*               | Besi-besi        | Leaf, stem      | Migraine/vertigo, insomnia |
| 99  | *Kaemferia pandurata*       | Temu kunci       | Rhizome         | Postpartum               |
| 100 | *Kaemferia galanga*         | Kacower          | Rhizome         | Postpartum, insomnia, Tumor, cancer, Stroke, virility |
| 101 | *Kalanchoe pinnata*         | Kapal - kapal    | Leaf            | Boil drug                |
| No.  | Latin name               | Local name       | Used parts  | Use                        |
|------|--------------------------|------------------|-------------|----------------------------|
| 102. | Koeleria sp               | Kisik            | Leaf        | Cold                       |
| 103. | Lageronia siceraria      | Labu guci        | Seed        | Child immunity             |
| 104. | Laportea sp.             | Galunggung       | Leaf        | Cold, malaria              |
| 105. | Leea aurantica           | Perbencil        | Leaf, stem  | Strengthen child memory    |
| 106. | Leptaspis urceolata      | Putur balik      | Leaf        | Tuberculosis               |
| 107. | Litium sp                | Nanggur          | Stem        | Stroke                     |
| 108. | Lindernia ruelloides     | Cucur-cucur      | Leaf        | Influenza                  |
| 109. | Litsea sp                | Gecih            | Bark        | Malaria                    |
| 110. | Lobelia angulata         | Sigarang-garang  | Leaf, fruit | Influenza                  |
| 111. | Macodes petola           | Surat dibata     | Whole of part | Tumor, cancer, fever   |
| 112. | Mallotus blumeana        | Balik angin      | Leaf        | Cold                       |
| 113. | Mallotus sp.             | Pera-pera        | Leaf        | Diarrhea                   |
| 114. | Manumia nemarosa         | Kewil-kewil      | Leaf        | Diarrhea                   |
| 115. | Melastoma malabaraticum  | Senduduk         | Root        | Tumor, cancer              |
| 116. | Mikania micrantha        | Jala-jala        | Leaf        | Stop bleeding              |
| 117. | Morinda citrifolia       | Pace             | Fruit       | Blood streamer             |
| 118. | Muntingia calabura       | Rabah-rabah      | Leaf        | Sprue                      |
| 119. | Musa paradisiaca         | Galoh            | Leaf        | Stop bleeding              |
| 120. | Myristica fragrans       | Pala             | Seed        | Cancer, virility, child    |
|      |                          |                  |             | immunity                   |
| 121. | Nauclea maingayi         | Lengit           | Leaf        | Rheumatic                  |
| 122. |                           |                  | Bark        | Diabetes                   |
| 123. | Nephelium mutabile       | Rambutangutan    | Leaf        | Diarrhea                   |
| 124. | Nervilia arogoana        | Selembang sibulan| Tuber       | Tuberculosis               |
| 125. | Nicotiana tabacum        | Bako             | Leaf        | Wound, cold                |
| 126. | Ophiorrhiza communis     | Jarum-jarum sifat| Leaf        | Encephalitis, diarrea      |
|      |                          |                  |             |                            |
| 127. | Orthosiphon stamineus    | Kwis kucing      | Leaf        | Kidney medicine            |
| 128. | Oryza sativa             | Page             | Seed        | Skin care                  |
| 129. | Oryza gutinosa           | Beras pulut      | Seed        | Tumor, cancer              |
|      |                          |                  |             |                            |
| 130. | Palaquium gutta          | Dareth - dareth  | Leaf        | Sprue                      |
| 131. | Pavetta indica           | Sira-sira        | Leaf        | Ear inflammation           |
| 132. | Peristerophe bivalvis    | Gara mata        | Root, leaf  | Cold                       |
| 133. | Phyllagathis griffithii  | Tanda langkup    | Leaf        | Miopic eye                 |
| 134. | Physalis minima          | Susulpak         | whole of part | Sprue                       |
| 135. | Physalis peruviana       | Culpa-culpa      | Leaf        | Hepatitis                  |
| 136. | Piper aduncum            | Belo-belo        | Latex       | Drug eye                   |
| 137. | Piper belte              | Belo             | Leaf        | Feminine medicine          |
| 138. | Piper crocatum           | Jaga-jaga        | Leaf        | Eye drop                   |
| 139. | Piper muricatum          | Rintih bulung    | Leaf        | Fracture                   |
| 140. | Piper nigrum             | Lada hitam       | Seed        | Insomnia, tumor, cancer,   |
|      |                          |                  |             | Stroke, virility, child    |
|      |                          |                  |             | immunity                   |
| 141. | Piper sarmentosum        | Belokar          | Leaf        | Drug itching               |
| 142. | Plantago mayor           | Patah tulang    | Leaf        | Fracture                   |
| 143. | Polygala longifolia      | Sunggul biangi   | Leaf        | Pain medication            |
| 144. | Polygala sp              | Kacilando        | Leaf        | Fever                      |
| 145. | Pometia pinnata          | Pakam            | Leaf        | Tonic                      |
| 146. | Portula sp               | Krah padang     | Leaf        | Anthelmintic               |
| No. | Latin name                  | Local name     | Used parts | Use          |
|-----|-----------------------------|----------------|------------|--------------|
| 147 | *Psidium guajava*           | Jambu biji     | Leaf       | Diarrhea     |
| 148 | *Psychotria stipulacea*     | Pradepr        | Leaf       | Sprue        |
| 149 | *Quercus sp*                | Karania        | Leaf       | Cold         |
| 150 | *Randia longiflora*         | Daun serit     | Leaf       | Kidney stone |
| 151 | *Rinorea sp*                | Tawar sekupah  | Leaf       | Tuberculosis |
| 152 | *Rostellularia sp*          | Satu ternaba   | Leaf, stem | Fever        |
| 153 | *Rubus moluccanus*          | Duri kopi-kopi | Leaf       | Drug itching |
| 154 | *Saccharum officinarum*     | Tebu           | Stem/node  | Wound        |
| 155 | *Santofilum sp*             | Katrina        | Leaf       | Fever        |
| 156 | *Sauropus androgynus*       | Tawar sekupah  | Leaf       | Breast milk streamer |
| 157 | *Schismatoglottis convolvula* | Birah merah   | Flower     | Eye drop     |
| 158 | *Scrurulla ferrugia*        | Surindam       | Root       | Cancer       |
| 159 | *Sida rhombifolia*          | Besar-beras    | Root       | Tumor, cancer |
| 160 | *Solanum torvum*            | Rimbang        | Fruit      | Eye drop     |
| 161 | *Sonchus arvensis*          | Sabi kabang    | Leaf       | Wound        |
| 162 | *Spilanthes fusca*          | Pesil          | Leaf       | Diarrhea     |
| 163 | *Stachytarpheta jamaicensis*| Rata bunga     | Leaf       | Diarrhea     |
| 164 | *Syzygium polyantha*        | Daun salam     | Leaf       | Blood streamer |
| 165 | *Tacca minor*               | Serengkaten    | Leaf       | Flatulence   |
| 166 | *Tarenna pulchia*           | Stekap         | Leaf       | Fever        |
| 167 | *Tinospora crispa*          | Akar ali-ali   | Stem       | Malaria      |
| 168 | *Trema orientalis*          | Nderung        | Leaf       | Wound        |
| 169 | *Triadica sp.*              | Tawan Gegeh    | Root       | Tumor, cancer |
| 170 | *Trichosanthes wallichiana* | Shoot          |           | Fever        |
| 171 | *Urena lobata*              | Sibagori       | Leaf       | Headache, fever |
| 172 | *Vitex quinata*             | Telu bulung    | Leaf       | Fever        |
| 173 | *Vitis gracilis*            | Gagatan        | Leaf       | Tumor, cancer, stroke, diarrhea |
| 174 | *Vitis quadrangularis*      | Riang-riang    | Leaf       | Rheumatic    |
| 175 | *Zea mays*                  | Jagung         | Seed       | Child immunity |
| 176 | *Zingiber aromaticum*       | Puyang         | Rhizome    | Postpartum   |
| 177 | *Zingiber cassumunar*       | Buri           | Rhizome    | Postpartum   |
| 178 | *Zingiber officinale*       | Baring         | Rhizome    | Insomnia, cancer, stroke, child immunity |
| 179 | *Zingiber officinale var rubrum* | Bahing gara | Rhizome    | Wound, cold, sore eye, massage oil |
| 180 | *Zingiber puberulum*        | Cekala menci   | Rhizome    | Cough        |
| 181 | *Zingiber purpureum*        | Bunge          | Rhizome    | Child of high fever |

The most widely used part of the plant as a medicinal ingredient was leaf (54%), followed by root/rhizome/tuber/bulb (19%), stems (7%), seeds (5%), bark (4%), (3%), fruits (4%) and others (4%) (Fig. 2). Leaves accumulated many important secondary metabolite compounds as tannins, alkaloids, and other organic compounds stored in vacuoles [5,9]. In addition in terms of practical and efficiency, the leaves were easily formulated to be used as ingredients of medicine [9]. The frequent harvesting of root materials and bark will damage the plants so that it was avoided as much as possible. Then, to maintain the availability of plants, the healer is recommended to use leaf material [11]. In the Bali community, the leaves are believed to have a strong treatment power [12].
The species of medicinal plants were used to treat 17 category of diseases including gastrointestinal disease, fever-cold-cough-influenza, tumor/cancer, neuropathic, throat-nose-ear, skin and genital, freshener-tonic-virility. The dominant use of medicinal plants is for the treatment of gastrointestinal diseases 35 species (15.5%), fever-cold-cough-influenza 25 species (11.1%), tumor/cancer 24 species (10.6%), neuropathic 23 species (10.2%), throat-nose-ear 14 species (6.2%), skin and genital 13 species (5.7%), freshener-tonic-virility 13 species (5.7%). Disease and number of plant species used for treatment can be seen in Table 2.

Table 2. Disease and number of plant species used for treatment.

| No. | Category of Disease                                      | Amount | %   |
|-----|---------------------------------------------------------|--------|-----|
| 1.  | Gastrointestinal                                       | 35     | 15.5|
| 2.  | Fever, cold, cough, influenza                          | 25     | 11.1|
| 3.  | Tumor, cancer                                           | 24     | 10.6|
| 4.  | Neuropathic                                            | 23     | 10.2|
| 5.  | Throat, nose and ear                                   | 14     | 6.2 |
| 6.  | Skin and genital                                       | 13     | 5.7 |
| 7.  | Freshener, tonic, virility                             | 13     | 5.7 |
| 8.  | Ophthalmic                                             | 10     | 4.4 |
| 9.  | Immunity, allergy                                      | 10     | 4.4 |
| 10. | Wound, bleeding                                        | 9      | 4.0 |
| 11. | Tuberculosis                                            | 8      | 3.5 |
| 12. | Blood circulation and cardiovascular                   | 8      | 3.5 |
| 13. | Obstetric and gynecology                               | 7      | 3.1 |
| 14. | Fracture                                                | 7      | 3.1 |
| 15. | Internal disease (lever, kidney, urologist)            | 7      | 3.1 |
| 16. | Rheumatism, uric acid, stiff                           | 3      | 1.3 |
| 17. | Others (Antidote, anti mosquito, memory, cosmetic)     | 9      | 4.0 |

Based on Table 2, it is known that almost all types of diseases found in the Karo community can be healed traditionally using medicinal plants. Field observations show that some patients prefer traditional treatments compared to conventional treatments. They reasoned that traditional treatments
is easier, safer, painless and cheaper. Even some patients switched to traditional medicine after some time undergoing conventional treatment. Nevertheless they acknowledge that traditional medicine requires patience and a longer time to heal.

3.3 Phytochemical content of medicinal plants
A total of 47 species of the common medicinal plants used in the treatment of Karoinese were tested to explore the phytochemical content. These plants were used as a single ingredient and some as a compound of several species of plants. The plant parts tested were roots/rhizomes/bulbs/tubers, stems, leaves, flowers and fruit peel. Some plant species were tested one part of the plant only while the other species were tested all parts of the plant used in medicine. The phytochemical content of these medicinal plants can be seen in Table 3.

| No. | Species          | Parts of plant | Flavonoid | Terpenoid | Alkaloid | Saponin |
|-----|------------------|----------------|-----------|-----------|----------|---------|
| 1.  | Allium cepa      | Bulb           | √         | √         | √        | -       |
| 2.  | Allium sativum   | Bulb           | -         | √         | √        | -       |
| 3.  | Alpinia striata  | Root           | -         | √         | -        | -       |
| 4.  | Anthocephalus cadamba | Stem   | -         | √         | -        | √       |
| 5.  | Arenga pinnata   | Root           | -         | √         | -        | -       |
| 6.  | Argostemma involucratum | Leaf | -         | √         | -        | -       |
| 7.  | Bischofia javanica | Stem       | √         | √         | √        | -       |
| 8.  | Boehmeria glomerulifera | Leaf | √         | √         | -        | -       |
| 9.  | Caryota sp       | Root           | -         | √         | -        | -       |
| 10. | Cassia alata     | Leaf           | √         | √         | √        | -       |
| 11. | Citrus limon     | Root           | √         | √         | -        | -       |
| 12. | Citrus aurantifolia | Fruit    | -         | √         | -        | -       |
| 13. | Costus speciosus | Leaf          | -         | √         | -        | -       |
| 14. | Crynum asiaticum | Stem          | √         | √         | √        | -       |
| 15. | Curcuma domestica | Rhizome    | √         | √         | √        | -       |
| 16. | Dendrophthoe sp  | Leaf           | -         | √         | -        | -       |
| 17. | Emilia grandiflora | Flower    | -         | √         | -        | -       |
| 18. | Gagatan Nipe     | Leaf           | -         | √         | -        | -       |
| 19. | Gleichenia linearis | Leaf  | √         | √         | -        | -       |
| 20. | Greenea corymbosa | Leaf        | -         | √         | -        | -       |
| 21. | Grewia acuminata | Leaf           | -         | √         | √        | -       |
| 22. | Hyptis capitata  | Leaf           | -         | √         | -        | -       |
| 23. | Impatiens balsamina | Flower | -         | √         | -        | -       |
| 24. | Impatiens sp     | Flower         | √         | √         | -        | -       |
| 25. | Impatiens sp2.   | Flower         | √         | √         | √        | -       |
| 26. | Justicia gendarussa | Leaf  | -         | √         | -        | -       |
| 27. | Justicia sp      | Leaf           | -         | √         | -        | -       |
Table 3 showed that some parts of the plants tested contain flavonoids, terpenoids, alkaloids and saponins while other plant parts contain only one phytochemical content. Nevertheless all the parts tested from the whole medicinal plant species have terpenoid content. The species that had all the flavonoids, terpenoids, alkaloids and saponins were Bischofia javanica (stem) and Curcuma domestica (rhizome) whereas the species that have only one secondary metabolite were Emilia grandiflora (stem and flower), Kaemferia pandurata (rhizome) and Phyllagathis griffithii (flower). Leaf was parts of plants that have the most secondary metabolites compared with other plant parts. This corresponds to the use of the most leaves in the treatment. Plant parts that contain a lots of secondary metabolites will be widely used in traditional medicine [13,14]. The secondary metabolites most rarely present in medicinal plants were saponins, these secondary metabolites were present only in a few plants: Anthocephalus cadamba (stem), Argostemma involucratum (stem), Curcuma domestica (rhizome), Leptaspis urceolata (leaf), Phyllagathis griffithii (leaf), Tarenna pulchia (stem and leaf), Zingiber cassumunarn (rhizome), and Zingiber sp (rhizome). Differences in environmental conditions of growth could lead to differences in types and amounts of secondary metabolites contained in plants. Another things were genetic, cultivation method, collection time, and post-harvest processing.

4. Conclusions
Traditional healers in the Karo community had a high knowledge in the use of plants for traditional medicine. There were 181 species of plants used by the Karo people as medicinal plants.

| 28. | Kaemferia pandurata | Rhizome | ✓ | ✓ | ✓ | - |
| 29. | Kaemferia galanga | Rhizome | - | ✓ | ✓ | - |
| 30. | Leptaspis urceolata | Leaf | - | ✓ | ✓ | ✓ |
| 31. | Mallotus sp | Leaf | - | ✓ | - | - |
| 32. | Melastoma malabatricum | Leaf | - | ✓ | - | - |
| 33. | Pavetta indica | Leaf | - | ✓ | ✓ | - |
| 34. | Phyllagathis griffithii | Flower | - | ✓ | - | - |
| 35. | Polygala sp | Leaf | - | ✓ | ✓ | - |
| 36. | Rinorea sp | Leaf | - | ✓ | - | - |
| 37. | Santofilium sp | Leaf | - | ✓ | ✓ | - |
| 38. | Solanum verbascifolium | Leaf | - | ✓ | - | - |
| 39. | Sonchus arvensis | Flower | - | ✓ | ✓ | - |
| 40. | Tarenna pulch | Leaf | - | ✓ | ✓ | ✓ |
| 41. | Tylophora sp | Stem | - | ✓ | - | - |
| 42. | Urophyllum sp. | Root | - | ✓ | - | - |
| 43. | Vernonia arboreea | Stem | - | ✓ | - | - |
| 44. | Vitex quinata | Leaf | - | ✓ | - | - |
| 45. | Vitis gracilis | Leaf | - | ✓ | - | - |
| 46. | Zingiber cassumunarn | Rhizome | - | ✓ | ✓ | ✓ |
| 47. | Zingiber sp | Rhizome | - | ✓ | ✓ | ✓ |

Note: (-) = absent; (✓) = present
Phytochemical screening showed that *Bischofia javanica* (cingkam) and *Curcuma domestica* (kaciwer) had all the secondary metabolite of alkaloids, terpenoids, flavonoids and saponins. Karo people had a strong relationship with the surrounding plant resources, especially in the use of plants as a traditional medicine.

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**References**

[1] Himmi S K, Humaedi M A and Astuti S 2014 4th International Conference on Sustainable Future for Human Security, SustaiN Procedia Environmental Sciences 20 841

[2] Lone P A, Bhardwaj A K and Bahar F A 2015 Afr J Tradit Complement Altern Med 1273

[3] Quansah N 2004 *Ethnobotany Research & Applications*. 2 89

[4] Raynor B and Kostka M 2003 *Ethnobotany Research & Applications* 1 55

[5] Silalahi M, Nisyawati, Walujo E B, Supriatna J and Mangunwardoyo W 2015 *Journal of Ethnopharmacology* 175 432

[6] Aththorick T A, Setiadi D, Purwanto Y and Guhardja E 2012 *Biodiversitas* 13 92

[7] Grandstaff S W and Grandstaff T B 1987 *KKU Prociding* 69–88

[8] Harbone J B 2001 *Phytochemical methods* (London: Chapman and Hall Ltd)

[9] Nasution B R, Aththorick T A and Rahayu S 2018 *IOP Conf. Series: Earth and Environmental Science* 130 012038

[10] Tag H, Kalita P, Dwivedi P, Das A K and Namsa N D 2012 *Journal of Ethnopharmacology* 141 786

[11] Mulilo K, Region C, Kazhila N, Chinsembu C and Hedimbi 2010 *Journal of Ethnobiology and Ethnomedicine* 6 25

[12] Sujarwo W, Keim A P, Savo V, Guerrera P M and Caneva G 2015 *Journal of Ethnopharmacology* 169 34

[13] Mathews M G, Oyemitana, Ajayi I, Opeoluwa O O, Oluwatobi O S, Benedicta N C, Phindile S S, Oyedeji and Omowumi A 2016 *Afr J Tradit Complement Altern Med* 13 179

[14] Adnan M, Bibi R, Azizullah A, Andalee R, Mussarat S, Tariq A, Ullah R, Elsalam N M A, Khan A L, Begum S 2015 *Afr J Tradit Complement Altern Med* 12 99