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Dr. Sayanika Borah

Assistant Professor, Deptt. of Extension and Communication Management, College of Community Science Assam Agricultural University Jorhat, Assam, India

MS Bondita Dutta

M.Sc Scholar, Deptt. of Extension and Communication, Management, College of Community Science Assam Agricultural University Jorhat, Assam, India

Dr. Manju Dutta Das

Professor, Deptt. of Extension and Communication, Management, College of Community Science Assam Agricultural University Jorhat, Assam, India

Correspondence

DR. Sayanika Borah

Assistant Professor, Deptt. of Extension and Communication Management, College of Community Science Assam Agricultural University Jorhat, Assam, India

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Indigenous technological knowledge (ITK) of rural women of Assam, India on selected herbal medicinal plants for the treatment of common ailments

Dr. Sayanika Borah, MS Bondita Dutta and Dr. Manju Dutta Das

Abstract

In India, a vast pool of traditional knowledge with respect to medicinal properties of native plants is available amongst rural people. Both rural men and women have a wealth of traditional knowledge. Herbal Medicinal plants are widely used traditionally because of its natural origin. Information on the uses of indigenous technological knowledge of herbal plants for medicine is not well documented from many rural areas of Assam. Therefore, an attempt is very urgent to explore the traditional or indigenous household remedies for the treatment of common ailments. It could provide the people of all nations especially in the Assam, with comprehensive health care. Thus the present study was undertaken to explore the existing practices of indigenous technological knowledge (ITK) by rural women of Assam, North-east India on herbal medicinal plants for the treatment of five selected common ailments. The study was conducted in the Jorhat District of Assam, India. A simple random sampling design was followed for selection of two blocks namely Dhekorgarah and Titabor from respective subdivision i.e. Jorhat and Titabor. One hundred (100) numbers of female respondents were selected from four (4) numbers of villages of the two blocks. First hand information was gathered by interview method. The data revealed that majority (67.00%) of the respondents was from medium socio economic status. The maximum number of respondents i.e. 98.00 percent respondents had used different indigenous technological knowledge on herbal medicinal plants for treatment of common ailments such as cold and cough, digestive problems, diabetes, urinary disorder and skin disease. The different parts (leaf, fruit, root and whole plant) of herbal medicinal plants were use for curing above mentioned ailments in the form of paste, extract, chutney or curry.

Keywords: Indigenous Technological Knowledge (ITK), Herbal medicinal plants, Common ailments, Rural women

Introduction

Plants have been an exemplary source of medicine since the time immemorial and many of the currently available drugs have been derived directly or indirectly from them. Ayurveda and other Indian literatures mention the use of plants in the treatments of various human ailments. Among the plant species (45000) of India, several thousands have been claimed to have medicinal properties. Even the plant folk medicine or indigenous technological knowledge (ITK) on herbal medicine reports about 2500 plant species that possess medicinal properties to cure common ailments (Rajasekharan and Ganeshan, 2002) [1].

Herbs had been used by all cultures throughout history, but India has one of the oldest, richest and most diverse cultural living traditions associated with the use of herbal medicinal plants. Herbal medicinal plants may be defined as those plants that are commonly used in treating and preventing different ailments. These are either "wild plant species" or "domesticated plants species" those that have arisen through human actions such as selection or breeding and depend on management for their existence. These herbal products are today the symbol of

safety in contrast to the synthetic drugs, that are regarded as unsafe to human being and environment. Although herbs had been priced for their medicinal, flavouring and aromatic qualities for centuries, the synthetic products of the modern age surpassed their importance, for a while. However, the blind dependence on synthetics is over and people are returning to the naturals with hope of safety and security. It is time to promote them globally.

In India, a vast pool of traditional knowledge with respect to medicinal properties of native plants is available amongst rural people. Both rural men and women have a wealth of traditional knowledge (Nair, 1998 and Dixit 2011) [2]. The whole set of information is lying scattered in bits and segments (especially in rural India) without any organization. Knowledge on Herbal Medicinal Plants is the ancient herbal plant knowledge transmitted over a period of time explaining the relationship between plants and traditional people for mutual care and benefit. Herbal Medicinal plants are widely used traditionally because of its natural origin. It reduces the side effects and dissatisfaction with the results of synthetic drugs. Among the various reasons of using herbal medicinal plants as herbal medicines are safer, cheaper and easily available than other medicines.

Herbal medicinal plants play an important role in rural areas and various locally produced drugs are still being used as household remedies for different ailments. The increasing use of traditional therapies demands more scientifically sound evidence for the principles behind therapies and for effectiveness of medicines. Herbal medicine is still the mainstay of about 75–80% of the world population, mainly in the developing countries for primary health care because of better cultural acceptability, better compatibility with the human body and lesser side effects. Also, traditional knowledge is the most affordable and accessible method available for the treatment of various ailments. Home medical knowledge, or knowledge of how one's surroundings can be used to maintain and restore health, can be an important tool for health self-sufficiency in rural places as well as for the ecological conservation of important plants and natural materials.

Assam is a state rich of forests, hills which are endowed with different plants and herbs of those most have high medicinal properties. Because of various advantages of the herbal medicines, most of the rural women of North–East India, specifically Jorhat District of Assam mostly prefer herbal medicinal plants for curing different ailments of their own or their family members (Bhattacharyya and Bhattacharyya, 2016) [3]. The traditional use of medicinal plants in healthcare practices is providing clues to new areas of research; hence its importance is now well recognized. However, information on

the use of indigenous technological knowledge of herbal plants for medicine is not well documented from many rural areas of Assam. Therefore, an attempt is very urgent to explore the traditional or indigenous household remedies for the treatment of common ailments. It could provide the people of all nations especially in Assam, with comprehensive health care practices. Thus the present study was undertaken with the following objectives.

Objectives

1. To study the socio-economic status of the respondents.
2. To explore the practices of indigenous technological knowledge (ITK) among the respondents on herbal medicinal plants for the treatment of selected common ailments.

Materials and methods

The study was carried out in Jorhat District of Assam, North-East India during the year of 2016-17. The descriptive research design, especially survey method was used in this study. A simple random sampling design was followed for selection of two blocks namely Dhekorgarah and Titabor from respective subdivision i.e. Jorhat and Titabor. A list of villages from each of the selected blocks was collected from Block Development Officers. While collecting data special care was taken to select such villages, which were most inaccessible to medical institute, poor transportation facilities and where record of use of such traditional practices of herbal medicine has been continuing till date. From the list, a total of four villages, two villages from each block were purposively selected. For the selection of respondents, a list of total household was prepared from each of the selected villages with the help of village leader. Adopting the methods of Jain (1964) [4], ethnomedicinal information was collected through general conversation with the informants such as village headman (gaon buhas), traditional healers (Bejs), local men and women. There was a formal discussion with these informants. The women folk were given a significant role in the discussion since they are found to possess more information about the use of local herbs in primary curing of various diseases. Among those 25 numbers of married women from different age, classes were selected from each village by using simple random sampling method. Thus altogether, 100 numbers of respondents were selected for the present study. The data regarding plant name, plants parts used, form or mode of preparation and treatment for common ailments were collected through personal interview method with the help of the interview schedule developed and analysed for the purpose according to objective of the study.

A brief Description of different forms of herbal medicinal plants commonly used

Forms	Description
Paste	Herbal paste is called kalka in Ayurveda. It is one of the basic dosage forms. In this study paste is defined as the fresh herb ground as it is or by adding water. Paste is used for external application and oral administration.
Extract	In Ayurveda pharmaceuticals and therapeutics, extract is described as primary and most potent dosage form. In this study extract is defined as immediately after collection of herbs, it is washed, crushed and by applying pressure the liquid or juice obtained. It can be used directly or diluted with water.
Curry:	In this study curry means first make a smooth paste of herbs, than heat oil, put the paste, boil the paste with a little more water and adjust seasoning with little salt and turmeric powder.
Oil:	Herbal oil is pure, whole, organic oil from natural source like herbs. In this study oil is defined as base oil infused with one or more herbs- combining the nourishing and soothing qualities of the oil with the healing properties of the herbs.
Raw	In this study raw form is define as directly eating or chewing fresh parts of the herbs.

Results and Discussions

The data collected from the rural women were systematically arranged, coded and analyzed keeping in mind and objective of the research study. The findings of the study and relevant discussion are presented under the following headings:

Socio Economic Status of the Respondents

Socio-economic status of the women is a prerequisite for any economic development programme. More encouragement and support needs to be provided to the women to improve their socio economic status. It was classified as low, medium and high after quantifying the factors as well as calculating standard deviation and mean.

The findings revealed that majority (46.00%) of the respondents belonged to middle age group i.e. 32-45 years and married (98.00%). Half of the respondents (50.00%) belonged to ST category and 70.00 percent respondents had farming as their main occupation. 60.00 percent respondents

belonged to small size family with 68.00 percent of the respondents were nuclear family. Majority 70.00 percent had education up to HSLC level and half of the respondents (50.00%) were no membership in any organization. 92.00 percent respondents were marginal land holding farmers and 52.00 percent had katcha type of house. Majority 58.00 percent and 90.00 percent of the respondents had medium level of household and farm assets respectively. More than half of the respondents (54.00%) had regularly watched Television and 96.00 percent of respondents had regular contact with NGOs and VLEWs. 60.00 percent respondents attended training programme regularly on different areas.

The data on socio-economic status of the respondent is presented in Fig.1 shows that majority (67.00%) of the respondents were from medium socio-economic status followed by (18.00%) high socio economic status and (15.00%) low socio economic status

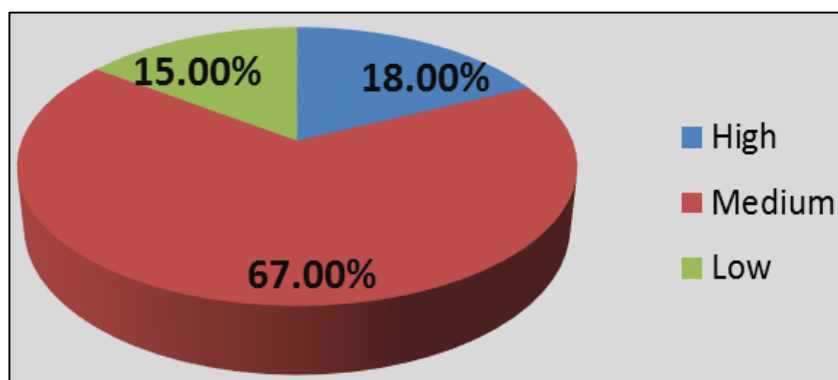


Fig 1: Distribution of respondents according to socio economic status

Practices of ITK among rural women on herbal medicinal plants for treatment of common ailments.

The data on existing practices of ITK on herbal medicinal plants by rural women for treatment of five common ailments i.e cough and cold, digestive problems, urinary disorder, diabetes and skin disease are presented in Table 1,2,3,4,5. It is consisted of distribution of respondents according to the use of herbal medicinal plants and their parts and form of use for the purpose of primary treatment of selected common ailments. The data reveals that various herbal medicinal plants like Holy basil, Turmeric, Black nightshade, Garlic, Onion, Ginger, Sweet flag, Curry leaf, Asiatic pennywort, Chinese flower, Heart leaf, Indian patchouli, Thumba, Chiretta, Rosy periwinkle, Acid plant, Coriander, Aloevera, Henna, Indian sorrel were used by them. Different parts such as leaf, fruit, root and whole plant of herbal medicinal plants were used for curing selected common ailments i.e. cough and cold, digestive problems, urinary disorder, diabetes and skin

disease in various forms like paste, extract, curry, oil and raw. (Bhattacharyya and Bhattacharyya, 2016) ^[5]. Herbal medicines are frequently used and popular in alternative and complementary medicine and have more preference for use in treatment of common ailments as shown by the published evidence in past (Duraz and khan, 2011) ^[6]. The result of our study also depicts the same.

ITK on use of herbal medicine for treatment of Cough and Cold.

The common cold is medically referred to as a viral upper respiratory tract infection. Symptoms of the common cold may include cough, sore throat, low-grade fever, watery eyes, nasal congestion, runny nose, and sneezing. Study reveals the cough and cold can be cure with Holy Basil followed by Ginger, Garlic, Onion and Sweet flag for cough relief. This finding corroborates to finding of (Wassi et.al.2015) ^[7].

Table 1: Distribution of respondents according to the use of parts and forms of herbal medicinal plants for the treatment of Cough and Cold.

Sl. No	Herbs			Percentage (%) of responses	
	Scientific Name	English Name	Local Name	Part use	Forms of use
1.	<i>Ocimum tenuiflorum</i>	Holy basil	Tulsi	Leaf (98)	Extract (98)
2.	<i>Curcuma longa</i>	Turmeric	Halodi	Root &Tuber (70)	Extract (70)
3.	<i>Solanum nigrum</i>	Black nightshade	Bhekuri tita	Fruit (44)	Paste (30), Raw (14)
4.	<i>Allium sativum</i>	Garlic	Nohoru	Clove (80)	Oil (80)
5.	<i>Allium cepa</i>	Onion	Piyaj	Fruit (76)	Raw (76)
6.	<i>Zingiber officinale</i>	Ginger	Adda	Root & Tuber (70)	Raw (70)
7.	<i>Acorus calamus</i>	Sweet flag	Boch	Leaf (76)	Paste (76)

Data on the Table 1. reveals that majority of the respondents used Holy Basil leaf (98.00%) as extract form followed by Garlic clove (80.00%) in oil form, Onion in raw form (76.00%), Sweet flag leaf (76.00%) in paste form, Ginger (70.00%) in raw form, turmeric root (70.00%) in extract form and Black nightshade fruit in paste and raw form (44.00%) for cough relief.

ITK on use of herbal medicine for treatment of Digestive Problems

Common digestive problems include heartburn/Gastroesophageal reflux disease (GERD), Inflammatory bowel disease (IBD), and Irritable bowel syndrome (IBS). Symptoms may include bloating, diarrhea, gas, stomach pain, and stomach cramps. It can be treated with Curry leaf, Asiatic pennywort, Chinese flower, Heart leaf and Thumba. This finding is supported by (Siddalinga and Vidyasagar, 2013) [8].

Table 2: Distribution of respondents according to the use of parts and forms of herbal medicinal plants for the treatment of Digestive Problems.

Sl. No	Herbs			Percentage (%) of responses	
	Scientific Name	English Name	Local Name	Part use	Forms of use
1.	<i>Murraya koenigii</i>	Curry leaf	Norohinho	Leaf (99)	Curry (99)
2.	<i>Centella asiatica</i>	Asiatic pennywort	Manimuni	Whole Plant (95)	Paste (25), Curry (70)
3.	<i>Paederia foetida</i>	Chinese flower	Bhedailota	Leaf (98)	Curry (98)
4.	<i>Houttuynia cordata</i> Thunb	Heart leaf	Mosondori	Leaf (98)	Paste (28), Curry (90)
5.	<i>Pogostemon Heyneanus</i>	Indian patchouli	Hukloti	Leaf (47)	Curry (47)
6.	<i>Leucus aspera</i>	Thumba	Durun	Leaf (70)	Extract (58), Curry (65)
7.	<i>Swertia Chirata</i> Ham.	Chiretta	Sirota	Leaf (45)	Extract (45)

Table 2. shows that highest of the respondents used Curry leaf (99.00%) in curry form, Chinese flower (98.00%) in curry form, Heart leaf (98.00%) in paste and curry form, Asiatic pennywort (95.00%) in paste and curry form followed by Indian patchouli and Thumba for curing digestive problems.

ITK on use of herbal medicine for treatment of Diabetes

Diabetes is a condition that impairs the body's ability to process blood glucose, otherwise known as blood sugar.

Different kinds of diabetes can occur, and managing the condition depends on the type. Not all forms of diabetes stem from a person being overweight or leading an inactive lifestyle. In fact, some are present from childhood. Diabetes mellitus (DM), commonly referred to as diabetes, is a group of metabolic disorders in which there are high blood sugar levels over a prolonged period (WHO, 2014) [9]. Data reveals that respondent used Black nightshade, Rosy periwinkle, Thumba and Chiretta for curing Diabetes.

Table 3: Distribution of respondents according to the use of parts and forms of herbal medicinal plants for the treatment of Diabetes.

Sl. No	Herbs			Percentage (%) of responses	
	Scientific Name	English Name	Local Name	Part use	Forms of use
1.	<i>Solanum nigrum</i>	Black nightshade	Bhekuri tita	Fruit (66)	Curry (66)
2.	<i>Catharanthus roseus</i>	Rosy periwinkle	Noyontora	Leaf (31)	Raw (31)
3.	<i>Leucus aspera</i>	Thumba	Durun	Leaf (20)	Extract (20)
4.	<i>Swertia Chirata</i> Ham.	Chiretta	Sirota	Leaf (18)	Extract (18)

Data from the Table.3 reveals that more than half of the respondents used Black nightshade fruits (66.00%) in curry form followed by Rosy periwinkle leaf (31.00%), Thumba leaf extract (20.00%) and Chiretta leaf extract (18.00%) for curing Diabetes.

ITK on use of herbal medicine for treatment of Urinary Disorder

Urinary disorders include any diseases, disorders or conditions that affect kidneys, ureters, bladder or urethra or that affect their function. Study shows that respondent used Acid plant and Coriander for treatment of urinary disorder. Similar finding also found by (Divya et.al, 2017) [10].

Table 4: Distribution of respondents according to the use of parts and forms of herbal medicinal plants for the treatment of Urinary Disorder.

Sl. No	Herbs			Percentage (%) of responses	
	Scientific Name	English Name	Local Name	Part use	Forms of use
1.	<i>Bryophyllum pinnatum</i>	Acid plant	Dupor tenga	Leaf (95)	Extract (95)
2.	<i>Coriandrum Sativam</i>	Coriander	Dhonia	Leaf (85)	Extract (85)

In the Table.4 found that majority of the respondents used Acid plant leaf (95.00%) in extract form and Coriander leaf extract (85.00%) for urinary disorder.

ITK on use of herbal medicine for treatment of Skin Disease.

Skin disorders vary greatly in symptoms and severity. They can be temporary or permanent, and may be painless or painful. Some have situational causes, while others may be

genetic. Some skin conditions are minor, and others can be life-threatening. Example of skin disease are Acne, cold sore, blister, allergy, eczema, skin rashes, contact dermatitis, skin irritation etc. While most skin disorders are minor that can be cure with some herbal medicines like Turmeric, Holy Basil, Aloe vera Henna, and Indian sorrel for skin disease. This finding is supported by (Bhagawati, 2003) [11] and (Shingadiya et al., 2016) [12]

Table 5: Distribution of respondents according to the use of parts and forms of herbal medicinal plants for the treatment of Skin Disease.

Sl. No	Herbs			(% of responses)	
	Scientific Name	English Name	Local Name	Part use	Forms of use
1.	<i>Ocimum tenuiflorum</i>	Holy basil	Tulsi	Leaf (78)	Extract (78)
2.	<i>Aloevera</i>	Aloevera	Saalkuwoori	Leaf (42)	Extract (42)
3.	<i>Lawsonia inermis</i> L.	Henna	Jetuka	Leaf (78)	Paste (78)
4.	<i>Allium cepa</i>	Onion	Piyaj	Root & Tuber (47)	Paste (47)
5.	<i>Curcuma longa</i>	Turmeric	Halodi	Root & Tuber (98)	Paste (98)
6.	<i>Oxalis corniculata</i> Linn	Indian sorrel	Tengesi	Leaf (69)	Paste (25), Curry (50)

Data on the Table. 5 reveals that nearly cent percent of respondents used Turmeric root paste (98.00%) followed by Henna leaf paste (78.00%), Holy basil (78.00%) in extract form, Indian sorrel leaf (69.00%) in paste and curry form, Onion (47.00%) in paste form and Aloevera leaf (42.00%) in extract form for skin disease.

Majority of the respondents (98.00%) used Holy Basil followed by Ginger, Garlic, Onion and Sweet flag for cough relief. Highest (99.00%) of the respondents used Curry leaf followed by Asiatic pennywort, Chinese flower, Heart leaf and Thumba for curing digestive problems. Black nightshade, Rosy periwinkle, Thumba and Chiretta were used for curing Diabetes. Acid plant and Coriander were used for urinary disorder. Nearly cent percent of respondents used Turmeric followed by Holy Basil and Aloevera for skin disease.

Most of the respondent (98.00) used leaf of nine numbers of herbal medicinal plants namely Holy Basil, Curry leaf, Mint, Indian Sorrel, Heart leaf, Acid Plant, Henna and Coriander for treatment of mentioned common ailment. Highest (98.00) percentages of respondents used root and tubers of three herbal medicinal plants i.e. Turmeric, Ginger, Garlic and Onion. Fruits of Black nightshade were used as herbal medicine. The respondents used whole plant of Asiatic Pennywort for treatment of digestive problem. Similar result also found by (Kumar et al., 2015).^[13]

Majority (78.00%) of the respondents used Henna in paste form for skin disease and Sweet flag (76.00%) for cough and cold. The respondents used Holy basil, Coriander, Aloevera and Acid plant in extract form. The respondents used Curry leaf, Mint, Indian sorrel, Heart leaf, Thyme leaf, Garlic, Onion, and Indian patchouli as curry form.

The data reveals that respondents practiced these ITK on herbal medicinal plants in paste, extract and Curry form. It might be due to the fact that the rural people were having the habit of practicing different herbal medicinal plants as food items. And herbal medicinal plants are easily available in their areas. On the other hand it is cost effective and relatively lesser side effect. Due to their medicinal value, use of these herbs in their daily diet and as medicine helps to cure common ailments and develop healthy and disease free lives. This finding is supported by (Kaur et al., 2015)^[14].

Conclusion

As our lifestyle is now getting techno-savvy, we are moving away from nature. But we cannot escape from nature because we are part of nature. As herbs are natural products they are free from side effects, they are comparatively safe, eco-friendly and locally available. Traditionally there are lots of herbs used for the ailments related to different seasons. There is a need to promote them to save the human lives.

North-East region in India is one of the important parts of mega bio-diverse region as it has been bestowed with diverse specific endemic plants (Chatterjee et al. 2006)^[15].

The present study is important since the knowledge on the ethno-medicinal uses of most of the plant species used by

rural women of Jorhat district of Assam, North-East India were limited and not being properly reported. The observation and data from the study shows that medicinal plants play an important role in proving primary health care to the rural people.

These herbal products are today the symbol of safety in contrast to the synthetic drugs, that are regarded as unsafe to human being and environment. Although herbs had been priced for their medicinal, flavouring and aromatic qualities for centuries, the synthetic products of the modern age surpassed their importance for a while. However, the blind dependence on synthetics is over and people are returning to the naturals with hope of safety and security. It is time to promote them globally.

More comprehensive scientific explanation and research needs to be carried out to draw the complete picture of traditional use of ingenious plants of this area. The present study is also essential to prevent the erosion of oral intangible culture and document a dying cultural heritage of global scenario.

References

1. Rajasekharan PE, Ganeshan S. Conservation of medicinal plant biodiversity- an Indian prospective. J Med. Aromat Plant. Sc. 2002; 24-132.
2. Nair CKN, Mohanan N. Medicinal plant of India with special reference to Ayurveda. Edn.1. Nag publishers, New Delhi. 1998; xvii:501.
3. Dixit U, Goyal VC. Traditional knowledge from and for elderly. Indian J of Traditional knowledge. 2011; 10(3):429-438.
4. Bhattacharyya LH, Bhattacharyya PN. Indigenous knowledge on the exploitation and utilization of medicinal plants by *Thengal Kachari* tribe of Jorhat district, Assam, North-east India". Current life Sc. 2016; 2(4):92-101.
5. Jain SK. The role of botanist in folklore research. Folklore. 1964; 5(4):145-50.
6. Bhattacharyya LH, Bhattacharyya PN. Indigenous knowledge on the exploitation and utilization of medicinal plants by *Thengal Kachari* tribe of Jorhat district, Assam, North-east India". Current life Sc. 2016; 2(4):92-101.
7. Duraz AY, Khan SA. Knowledge, attitudes and awareness of community pharmacists towards the use of herbal medicines in muscat region. Oman Med J. 2011; 26(6):451-453.
8. Wassi SM, Aragie LL, Taye BW, Mekonnen LB. Knowledge, attitude and utilization of traditional medicine among the communities of Merawi town, Northwest Ethiopia: Across-sectional study. Evidence based complementary and alternative medicine. 2015; 117-120.
9. Siddalinga MSM, Vidyasagar GM. Medicinal plant used in the treatment of gastrointestinal disorders in Bellary

- district, Karnataka, India. Indian J of Traditional Knowledge. 2013; 12(2):321-325.
10. World Health Organization, 2014. "About diabetes".
 11. Divya R, Divya BA, Rakshitha N, Ramya MS, Jeevan R, Shashikala S *et al.* Traditional Knowledge on medicinal plants among rural people in Chintamani Taluk, Karnataka, India. J of Medicinal Plants Studies. 2017; 5(1):13-20.
 12. Bhagawati U. Utilization of medicinal plants by the rural women of Kullu, himachal Pradesh. Indian J of Traditional knowledge. 2003; 2(4):366-370.
 13. Shingadiya RK, Agarwal SB, BEdarkar PB, Patgiri BJ, Prajapati PK. Unique methods of Swarasa (Juice) extraction in Ayurveda. Joinsysmed, 2016; 4:230-2
 14. Kumar S, Navneet, Gautam SS. Screening of antimicrobial properties of *J sminum sambac* Linn. Leaf extract against dental pathogen Res. J of Phytochemistry. 2015; 9(4):195-200
 15. Kaur J, Rani S, Singh G, Sood N. Ethnomedicinal knowledge reserves amongst rural women in Jind distric of Haryana, India. J of Med. Plant Studies. 2015; 111-113.
 16. Chatterjee S, saikia A, Dutta P, Ghosh D, panging G, Goswami AK. Biodiversity significance of North-east India, Forest conservation programme, WWF-India, 172 B Lodi Estate, New Delhi, 2006.
 17. Saikia B. Ethnomedicinal plants from Gohpur of Sonitpur district, Assam. Indian J of Traditional Knowledge. 2006; 5(4):529-530.