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A study on prevailing ethno-veterinary practices in north-eastern ghat regions of Ganjam and Kandhamal districts, Odisha

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Abstract

The north eastern ghat region of Ganjam and Kandhamal districts, Odisha is rich in fauna and flora. The bio-diversity of the area provides opportunity for the use of wild and Cultivated plants in ethno-veterinary practices. Use of allopathic drugs and anti-microbial has increase the detrimental effect on livestock population forcing the treating community to search for alternative therapies. Use of medicinal plants can play a pivotal role in this scenario. Natives of the region has untapped knowledge on plants that has ethno-veterinary applications. These plants need to be documented for their use before the knowledge erases from local population of the region. The present study was carried out to collect data on ethno-veterinary practices adapted by natives of the area and document it. A total of 357 numbers of farmers, livestock owners, elderly people and local quacks or traditional healers were enquired for the use of various ethno-veterinary practices and the result was analysed for obtaining a prospect of prevailing traditional knowledge in the region and its level of extinction.

Keywords: Ethno-veterinary, medicinal plants, north eastern ghat, Odisha

Introduction

India is the land of ayurveda and the practice of using herbs for treatment has traced their roots to ancient civilizations of the country. Several ancient and modern literatures have depicted usefulness of herbs in treating animals. Several plants which are not farmed or grown ornamentally are known to have medicinal components aiding animal health and production (Jain & Srivastava, 2003; Panda *et al.*, 2017) [5, 10]. Ethno-veterinary practise is defined as the use of traditional knowledge for the treatment of animals and augmenting production in some cases (Mc Corkle, 1986) [7]. Use of medicinal plants is an integral part of ethoveterinary practices having greater potential for future prospective.

The use of medicinal plants was reduced due to use of modern and synthetic medicines over the years. With the discovery of antibiotics medicinal plants left the scenario of health management both in human and veterinary practices. However in rural and under privileged parts of India still these practices are going on to some extents. Owing to the detrimental effects of allopathic medicines, a resurgence of interest in ethno-veterinary practice is being noticed in the treating community (Yineger *et al.*, 2007) [19]. With India being depended on its livestock resources for economy, animal health has a paramount importance in animal husbandry sector. Several ancient records have given proof of ethno-veterinary practice in India.

India is rich in bio-diversity resources which are evident from having 7% of the world's flowering plants (Swaminathan *et al.*, 2016) [17]. The eastern ghat is a range of mountains spreading across different states on the eastern front of India. It is habitat to a great range of bio-diversified flora and fauna (Udayan *et al.*, 2006; Parthipan *et al.*, 2011) [18, 12]. The district of Ganjam and Kandhamal falls in north eastern ghat region housing many mountains along with wide range of flora, fauna. Many tribes and local residents of the region are well aware of traditional ethno-veterinary treatment methods and use of plants for ailing diseased animals. The knowledge is being passed from generation to generation without any written scribe. However the knowledge and art of using it is vanishing rapidly among the population.

Various studies have been conducted to ensure documentation of knowledge prevailing in eastern ghat region regarding medicinal plant use in different states. However, very few studies have been reported on use of ethno-verinary practices and use of plants for treatment in

north eastern ghat region of Odisha state. The present study was attempted to collect information on prevailing ethno-veterinary practices with special emphasis on use of medicinal plants in veterinary practices among the local population residing in the north eastern ghat region.

Materials and Methods

The present study was planned to gather prevailing knowledge of ethnoveterinary practices and use of medicinal plants. The study was carried out in different blocks of Ganjam and Kandhmal districts of Odisha state. These blocks included Bhanjanagar (19.9358° N, 84.5825° E), Jagannathprasad (19.9624° N, 84.7786° E), Surada (19.7577° N, 84.4343° E), Buguda (19.8115° N, 84.7916° E), Belaguntha (19.8825° N, 84.6361° E), Dharakote (19.6441° N, 84.5753° E) of Ganjam district and G.Udayagiri (20.1189° N, 84.3750° E), Raikia (20.0614° N, 84.2358° E), Chakapada (20.2865° N, 84.4783° E), Daringibadi (19.9037° N, 84.1303° E), Tikabali (19.7986° N, 84.3673° E) of Kandhmal district. The field study was carried out during the period of October, 2021 to October, 2022 using extensive and intensive field visits.

The data was collected using a set of questionnaires asked to farmers, livestock owners, elderly people and local quacks or traditional healers using herbal medicine. The procedure included name of the plants being used and method of application. Traces of obsolete knowledge on ethnoveterinary medicine were also collected from elderly people. The data was collected on plants used by locals and the plants were taxonomically identified with the help of Agriculture and Horticulture Scientists of Krishi Vigyan Kendra, Ganajm (Bhanjanagar). The available plant samples were collected for identification by the scientists. The collected data was analysed for determining the extent of knowledge available in the present population of the area along with establishing most prominently used plants in veterinary treatment. A total of 357 responses were recorded during the study.

Results

Based on interaction with surveyed population few plants were documented for their use in ethnoveterinary practice. Some of the plants and their preparations are well known while some plants were documented for their rarity in use. Some of the prominent practices followed by the surveyed population are presented below:

- 1. Agasthi (*Sesbania grandiflora*):** The plant leaves are conceived to be effective against cold and fever when fed raw to the ruminants. Approximately 250 – 500g is fed to cattle for fever control.
- 2. Amarpoi (*Bryophyllum pinnatum* / *Kalanchoe pinnata*):** It is known to be given to the animals in diarrhoea and colic. Digestive disorders like in-appetence and diarrhoea can be cured by feeding raw leaves and whole plants. Mostly small ruminants were reported to be fed with 100 – 200 g of plant or leaf.
- 3. Anantamula (*Hemidesmus indicus*):** Root, leaves and stem of the plant used for treating cold and fever. 50g of root is fed to small ruminants for reducing fever while the dose ranges from 100 – 200g in case of large ruminants. Leaves and stem paste can also be used for fever, cold and skin wound remedy as keyed out by locals. The dried root powder can be fed regularly for treating impotency in bucks.

- 4. Aparajita Black (*Clitoria ternatea*):** The root is fed to the ruminants for alleviating fever mostly during three day sickness in cattle.
- 5. Arakha (*Calotropis spp.*):** The milk from leaves is very much effective against the fresh wounds and the boiled leaves are applied on the broken edges of wound for early recovery. The boiled leaves hasten wound healing as observed and averred by locals.
- 6. Arjuna (*Terminalia arjuna*):** The bark or leaves of the tree is crushed and the juice prepared is taken by animals for fever control.
- 7. Ashoka (*Saraca indica* / *asoca*):** The bark of the plant used for reproductive failure of ruminants. Approximately 50 g of bark is crushed and fed to animal for curing reproductive problems like anestrus. The plant leaves are also used for controlling vomition and diarrhoea.
- 8. Aswagandha (*Withania somnifera*):** Raw leaf paste is used for controlling fever in ruminants. 100-250 g of fresh leaves is used for the purpose.
- 9. Bacha (*Acorus calamus*):** The plant root is a traditional medicinal herb in human medicine but its use as an ethno-veterinary component is not very well versed. However, few traditional medicine practitioners advocated for digestive disorders treatments in ruminant and non-ruminants.
- 10. Baigaba (*Jatropha gossypifolia*):** The plant's leaves, stems, roots, fruits, and latex are used in ethno-veterinary practices. The latex is believed to be having blood coagulant and antiseptic use on wounds. The leaf, stem and fruit crust can be used for pain relief. The fruit is believed to have analgesic effects against colic and injury pain. But owing to its poisonous nature the fruit is always used at a very lower dose and dose is increased at a slower rate to attain the desire effect.
- 11. Bajramuli (*Sida rhombifolia*):** The root and stem crushed can be applied on the fresh wound for prompt healing and preventing infection.
- 12. Bamboo leaves (*Bambusa tulda*):** The leaves used for treating diarrhoea and believe to be having astringent properties. It is mostly used in small ruminants for treating diarrhoea. The leaves are fed at 50 – 100 gram per animal.
- 13. Basanga (*Adhatoda vasica*) and Begunia (*Vitex negundo*) leaves:** Leaves are boiled for few minutes and then the boiled leaves applied over the painful areas for analgesic and anti-inflammatory effects.
- 14. Begunia (*Vitex negundo*):** Leave of the plant is used for pain easement in ruminants and other animals. Raw leave paste is applied over painful areas. The paste is used for treatment of skin lesions. The paste is believed to be highly efficacious against fever, pain and inflammation. The insect repellent property of the leaves is also well versed among locals and livestock owners. Raw leaves are hung in shed and also dried leaves are burnt for desired repellent effect.
- 15. Bheji baigana (*Solanum torvum*):** The fruit of the plant is fed to improve immunity during winter season. The fruits believed to reduce effect of cold and increase immunity against viral diseases of ruminants.
- 16. Bhuin Anla/Badi Anla/Bila Anla (*Phyllanthus amarus*):** It is believed to be a magical herb among the farmers of the area. It is consider as a potent immunity

booster. Soups of leaves along with fruits are taken by both human and livestock in the area as a precautionary measure and during the needs. In case of livestock raw leaves are fed for boosting immunity. Infection in eyes, conjunctivitis is known to be treated by the paste of the leaves. The leaves paste is also used to treat open and infected wound. Before the winter and outbreak of viral diseases many livestock owner believed to include the leaves and fruits in animal and poultry diet. The plant is also known to have effects in case of fever. Drinking juice can provide relief from fever arising due to jaundice or liver dis-functions.

17. **Bhuin Nimba/Chideita (*Andrographis paniculata*):** The plant is believed to be one of the most effective in controlling parasite infections by the locals. Deworming with the plant leaves is a most common practice among the inhabitants. 50 – 100 gram of leaves is fed to calves and small ruminants while 150 – 200 gram can be fed to adult cattle. In poultry dried leaves can be added to the ration for controlling internal parasite as believed by local livestock owners and adults. The leaves are also very useful in treating wound and pox lesion. Raw leaf paste can be applied over wound and pox lesion along with turmeric or alone. Infected and pus filled wounds are treated with paste of the leaves and turmeric in some cases. The plant leave paste is also applied over the skin for controlling external parasites like tick and lice.
18. **Bisalyakarani (*Tridax procumbens*):** The plant leaves are known to have magical healing effects on wounds. Locals use it frequently for treating skin wounds of various origins.
19. **Brahma jasti (*Clerodendrum indicum / serratum*):** The root of the plant is used for assuaging cold, nasal impaction and fever. The root is grinded and fed to animals. Small ruminants are fed @ 50gram while large ruminants fed @ 100-200 gram depending upon weight of the animal.
20. **Dhala chita (*Plumbago zeylanica*):** Leaves are used for fever alleviation and deworming. Crushed raw leaves fed to animals for fever control and deworming in both ruminant and mono-gastric animals.
21. **Ginger (*Zingiber officinale*):** It is one of the most commonly used herbs for cold in goat and cattle. Dry or even fresh ginger is fed to the cattle and goats for treatment of cold and sore throat. In poultry ginger paste fed to the birds for treating cold and sneezing symptoms. Some farmers use it as a precautionary measure in winter for poultry and practise feeding of ginger in small amount every day.
22. **Grhutakumari/Gheekuanri/Alovera (*Aloe vera/Aloe barbadensis*)** The fresh Aloe Vera gel can be apply on the wound, burns, acne, bruises and has magical effect on the skin disease as reported by many farmers and local herb practitioners.
23. **Guava leaves and immature fruits (*Psidium guajava*):** The leaves and immature fruits are crushed and given to the diarrhoeic animal and has curative effect on diarrhoea in ruminants. Leaves amounting 250 gram and 500 gram is used for small and large ruminants respectively. Similarly crushed immature fruits are fed approximately @ 100gram and 250 gram for relieving diarrhoea.
24. **Hada joda/ hada bhanga (*Cissus quadrangularis or Vitis quadrigularis*):** The vine plant is used for pain, fracture, swelling by livestock owners and herbal medicine users. The whole plant is used as raw paste for application over the affected part. Feed supplementation of dried plant is believed to have effect on bone formation in kids and calves.
25. **Kala Haladi/Krushna Kedar/Black Turmeric (*Curcuma caesia*):** It is one of the most used herbs among the local healers and traditional medicine practitioner. It is considered as wonder herb among the locals. However its availability has reduced mainly due to reduced used of herbs in human and veterinary use. Black turmeric has been in use in human and veterinary use by local healers. It is used for fever, systemic infection, and infected wound treatment. The dried powder of the rhizome used for controlling fever in large and small ruminants and poultry. Before the winter season feeding of the powder has believed to be providing immunity against pox and other viral diseases. The plant is said to be having curative properties against snake bite. As per locals applying of paste over snake bite site and drinking its juice has proven results in snake bite victims.
26. **Kochilla (*Strychnos nuxvomica*):** The plant is infamous for poisonous nature of fruits and seed. However some locals use them in very lower quantity to control pain in injured animals. The analgesic effect depicted by locals may be attributed to its nerve stimulant properties.
27. **Labanga / Clove (*Syzygium aromaticum*):** The well known spice plant also shared its ethno-veterinary effect among animals. It is effective against gum and teeth problem. Paste of the fruit is used to relieve painful gum and tooth ache. In some cases it is believed to be having anti-cold effect in animals and birds owing to its spicy nature. Locals believe the plant can increase the temperature of the body and can nullify the effect of cold winter nights.
28. **Madaranga (*Alternanthera sessilis*):** The plant is believed to have galactogauge properties when fed to lactating animals. Mostly lactating does are fed with the plant for facilitating milk flow and production for kids.
29. **Marigold leaves (*Tagetes spp.*):** The paste of the leaves and flower is effective in freshly cut wounds and has healing property as reported by herb practitioner.
30. **Kanak champa (*Magnolia champaca*):** The flower and the leaf pastes are applied on the wound and for pain relief. The leaves and flowers are crushed and applied over painful areas externally and can provide relief as observed by traditional medicine practitioners.
31. **Mustard (*Brassica nigra*):** Raw mustard and leaf paste is being used for treating cold symptoms in poultry. Raw mustard is fed the birds suffering from signs of cold and better results are always guaranteed as suggested by the locals.
32. **Nanda Babuli/Nanda baguli/Bana Tulasi (*Ocimum canum*):** The leaves are used in eye infection, conjunctivitis as curative. The raw leaf paste is used for the purpose. The dry leaves also used for pulse storage.
33. **Neem (*Azadirachta indica*), Karada/Kara (*Pongame oiltree*), begunia (*Vitex negundo*) leaves smoke:** Raw leaves of these plants are burnt inside the shade and animals are made to inhale the smoke which believed to control the symptoms of Haemorrhagic Septicaemia (HS). HS is a bacterial disease of ruminants having broncho-pulmonary problems. The smoke is believed to

have effects like bronchodilator and fomentation. It opens air ways and controls the swelling as reported by adults.

34. **Neem (*Azadirachta indica*):** The age old familiar medicinal plant is used to treat infected wound, deworming, maggotted wound, and external parasite infestations. The plant leaves are used in paste form and applied over superficial skin wounds for quick healing and preventing infections. The raw leave paste and dried powder is used for treatment of maggotted wound effectively. The leaves paste is applied alone or in combination with haldi (*Curcuma longa*) for removing external parasites from skin of animals and birds. Plant leaves are boiled in water and the water is sometimes reported to be used for bathing animals and birds for treating external parasite infestation of animals and birds which includes tick, mite and flea primarily. The juice of the leaves and paste is fed to ruminants for treating internal parasites in the process of deworming. For adult cattle and adult small ruminants around 500 gram and 200 gram leaves are grinded and the juice prepared from it is fed to the animal for relieving internal parasites. Same amount of leaves can be made as paste and can be fed for similar kind of deworming. However this practise is avoided after first trimester of pregnancy in animals as it may cause abortion as reported by locals and livestock owners indulged in these practices.
35. **Onion, garlic and ginger paste:** Fed to the poultry for cold and sneezing symptoms in poultry. It is a common practice among indigenous poultry owners.
36. **Pokasungha (*Chromolaena odorata*):** For maggotted wound treatment the leaves and flowers are being used. Paste of leaves and flowers applied over wound to prevent maggot formation.
37. **Polanga (*Calophyllum inophyllum*):** The seed powder is used for wound healing. Ripe fruit is being used for laxative purpose in ruminants. The oil produced from fruit can be used for treating FMD wounds of foot and hoof.
38. **Raw cotton (*Gossypium herbaceum*):** the charcoal produced from the raw cotton burning has been used in FMD wounds foot and hoof and also in other normal wounds.
39. **Sal tree (*Shorea robusta*):** The latex of the tree is used for wound healing and believed to have good antiseptic and anti-bacterial properties.
40. **Satavari (*Asparagus racemosus*):** The root of the plant fed once daily at a dose of 10 – 50 g as galactogogue by native dairy animal owners.
41. **Sisoo wood oil (*Dalbergia sissoo*):** The plants raw wood is cut in to small pieces and boiled along with a small amount of water in a copper container preferably. The stem is collected by putting a lid just over the container leaving some gap. The sticky and oily condensed stem is collected and is applied over wounds. This preparation is most effective against FMD wound of foot and hoof.
42. **Sita fala (*Annona reticulata*) leaves:** The leaves are used for maggotted wounds. 7 - 8 raw leaves are made paste and applied over and inside the maggotted wound. The paste is believed to provide excellent results for healing of the wounds.
43. **Sweta puspa (*Barleria cristata*):** The raw leaves and flowers are used for pus filled wound and swelling. The antibacterial effect of the plant parts are vocalized by

ethno-medicine users of the surveyed area.

44. **Tulsi (*Ocimum tenuiflorum / sanctum*) and Black tulsi:** The holy plant is one of the widely used one in human ayurveda. As per locals and traditional medicine users the plant is mostly used to treat cold in all animals and birds. Approximately 10 gram of fresh leaves is fed to poultry and pet birds for relieving cold. Similarly depending upon body weight small ruminants can be fed up to 50 gram of fresh leaves during cold treatment. Cattle are generally not fed with these plants owing to their large size and consequent requirement of leaves in larger amount. Dried leave powder has also been reported to be used in large, small ruminants and birds for treating cold symptoms. The plant leaves and other parts also used to treat infected wounds. Paste of raw leaves is applied over wounds for reducing or preventing bacterial infection. The plant is known to boost immunity in cattle, small ruminants and birds when fed regularly. Black tulsi with purple colour leaves is believed to be more potential than its green leave counterpart. It is generally used in cold, throat infections, lesions, ear ache and skin diseases.
45. **Turmeric (*Curcuma longa*):** Powder of dry turmeric used for maggotted wound and other wounds of cattle and small ruminants. Aqueous paste of the powder applied over the wound and pushed in to the maggotted wound. The preparation is known to have positive effects on wounds and maggotted wounds. Leaves of the plant often used to cover the accidental wound or even burn wounds. The paste is also very effective against pox lesion in all livestock and poultry. Along with Neem leaves turmeric paste is being used over the pox lesion for drying and scab formation. Its efficacy of the preparation is said to have proven results among livestock.
46. **Wood apple/Bela (*Aegle marmelos*):** Raw and immature fruits and leaves can be fed for controlling diarrhoea and dysentery. Similarly as per local livestock owners and herbal medicine practitioner burnt seed and immature fruits can be fed to large and small ruminants for alleviating diarrhoea.

One summary of above plants, their habit and parts used for ethno-veterinary purpose is summarised in Table - 1 indicating extent of use of plant parts in ethno-veterinary applications. Similarly Fig -1 & 2 indicates the type of plant (tree, shrub and herb) and plant parts used for the ethno-Veterinary purpose. The data analysed showed leaves being used in higher proportions (40.58%) followed by fruit, root, flower, stem, latex, rhizome, whole plant, bark and seed. The collected data was analysed to estimate the presence of knowledge among the native population and the extent of its use in livestock. Fig – 3 showed the data on percentage (%) of surveyed population having knowledge on plants and percentage (%) of population actually using it. It was evident from the analysis that although natives have knowledge on the use of plants, the extent of use is comparatively less. However the aware population use the ethno-veterinary practices occasionally. The surveyed population is well aware of some very common plants like tulsi, neem, alovera, ginger, turmeric etc. but knowledge of certain plants are quite rare like anantamula, baigaba, aparajita, basanga, sweta puspa, dhala chita etc. Certain plants like bhuin amla, bhuin neem, kali haldi, hada jod etc. were found to be popular among

traditional healers and people using medicinal plants for treating human and animals. Fig – 4 showed the extent of knowledge among different age groups regarding use of ethno-veterinary practices. It was apparent from the data that younger generation is having very scanty amount of knowledge regarding the quondam practice of ethno-veterinary use of medicinal plants. If the present trend will continue among the native population, the knowledge will soon be abolished in next few generations.

Discussion

The present study was carried out with an objective to sieve out plants used in ethno-veterinary practices by the natives of eastern ghat region of Odisha. The local farmers, adults and traditional medicine practitioners accounted for many well known ethno- botanical plants being used for treating animals and birds. The eastern ghat region has been reported to be home of many medicinal plants used in both ethno botanic and ethno veterinary use (Swaminathan *et al.*, 2016) [17]. However many plants were believed to be reported for the first time for being used in ethno-veterinary practices. The surveyed population enlightened forty six (46) plant and plant preparations during the survey (Table no I). Among these plants habit of the plants used by the population was found to be almost similar. The ethno-veterinary plants included tree (36.96%), herbs (32.61%) and shrub (30.43%) as depicted in Table no I & Fig no I. This shows the native population's cognition on bio-diversity of the plants and their use for livestock health and well-being which was also described by previous workers (Raut *et al.*, 2013) [15]. The use of leaf is the most prevalent practice followed by fruit and root. Other plant parts like stem, latex, bark, flower, whole plant, seed and rhizome were also reported to be used according to plants. Use of various plant parts has been reported previously (Panda & Mishra, 2016) [11]. This showed the native populations knowledge on use of specific part for specific cause. This knowledge is first reducing from the population owing to lack of documentation of these plants (Mallik *et al.*, 2012; Mishra, 2016) [6, 9]. Although attempts have been made to preserve the ancient art of healing in human but the same is far lagging behind in case of veterinary practices. The study showed use of certain plants being used at a higher percentage for treating various livestock conditions. Plants like Tulsi, Neem, Turmeric (*Curcuma longa*), Begunia (*Vitex negundo*), *Phyllanthus amarus*, *Andrographis paniculata*, *Aloe vera*, *Cissus quadrangularis*, Black Turmeric (*Curcuma caesia*) has been recorded for their use in human ayurveda and ethno-medical practices (Zaidan *et al.*, 2005; Patel *et al.*, 2011; Alli *et al.*, 2011; Baghel *et al.*, 2013; *Hadem et al.*, 2014; Fathima *et al.*, 2015; Patro, 2016) [20, 13, 1, 2, 4, 3, 14] but the same has also been found to be effective in animal health management as per the present study results. Apart from most commonly used etho-botanical plants few plants were reported to be highly effective in etho-veterinary applications. These plants included *Phyllanthus amarus*, *Andrographis paniculata*, Black Turmeric (*Curcuma caesia*), Begunia (*Vitex negundo*) and Sisoo wood oil (*Dalbergia sissoo*) which is in line with other reports (Mishra, 2013) [8]. Many plants reported in the study have also been advocated by other authors for ethno-veterinary use (Swaminathan *et al.*, 2016; Shrivastava *et al.*, 2017) [17, 16]. Fig – III depicted the Percentage (%) of surveyed population having knowledge of the medicinal plant vs

Percentage (%) of surveyed population used the plant vs Percentage (%) of the known population used the plant. The result showed that the size of the population is reducing in having knowledge and use of specific plants in ethno-veterinary practices. Plants like Tulsi, Neem, Turmeric (*Curcuma longa*), Begunia (*Vitex negundo*), *Phyllanthus amarus*, *Andrographis paniculata*, *Aloe vera*, *Cissus quadrangularis*, Black Turmeric (*Curcuma caesia*) has major share in population but certain less used plants are likely to be extinct from the memory of the native population as per the data obtained. This crude knowledge on use of plants for livestock treatment is required to be documented before its erosion from human memory.

Table 1: Summary of medicinal plants, their habit and parts used

Sl.no	Name of the plant	Habit	Parts used
1	Agasthi	Tree	L
2	Amarpoi	Herb	L, WP
3	Anantamula	Shrub	R,L,S
4	Aparajita Black	Herb	R
5	Arakha	Shrub	L, Lx
6	Arjuna	Tree	B,L
7	Ashoka	Tree	B,L
8	Aswagandha	Shrub	L
9	Bacha	Herb	R
10	Baigaba	Shrub	L, S, R, Lx, F
11	Bajramuli	Shrub	R,S
12	Bamboo	Tree	L
13	Basanga	Shrub	L
14	Begunia	Tree	L
15	Bheji baigana	Shrub	F
16	Bhuin Anla	Herb	L,F,WP
17	Bhuin Nimba	Herb	L
18	Bisaly akarani	Herb	L
19	Brahma jasti	Shrub	R
20	Dhala chita	Shrub	L
21	Ginger	Herb	Rz
22	Gheekuaanri	Herb	L
23	Guava	Tree	L,F
24	Hada joda	Herb	WP
25	Kala haladi	Herb	Rz
26	Kochilla	Tree	F, Se
27	Labanga	Tree	F
28	Madaranga	Herb	WP
29	Marigold	Herb	L, FL
30	Kanak champa	Tree	L, FL
31	Mustard	Herb	L,F
32	Nanda babuli	Shrub	L
33	Neem	Tree	L
34	Karada/ Kara	Tree	L
35	Onion, garlic and ginger paste	Herb	Rz
36	Pokasungha	Shrub	L,FL
37	Polanga	Tree	F, Se
38	Raw cotton	Tree	F
39	Sal tree	Tree	Lx
40	Satavari	Shrub	R
41	Sisoo wood oil	Tree	Lx
42	Sita fala	Tree	L
43	Sweta puspa	Shrub	L,FL
44	Tulsi / Black tulsi	Shrub	L,FL,S
45	Turmeric	Herb	Rz
46	Wood apple/ Bela	Tree	L,F

Abbreviations: Leaves (L), Whole plant (WP), Root (R), Stem (S), Latex (Lx), Bark (B), Seed (Se), Fruit (F), Rhizome (Rz), Flower (FL).

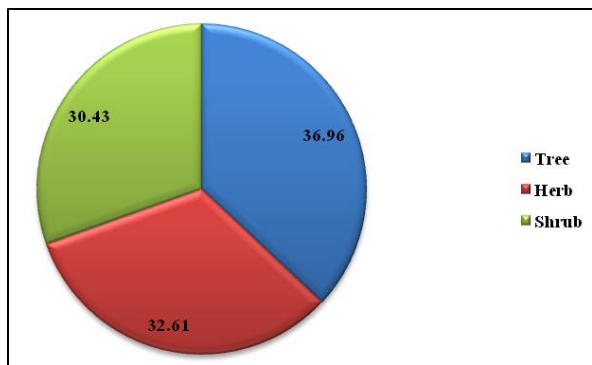


Fig 1: Types of Plant (in %) used by the surveyed population for Ethno-veterinary practices

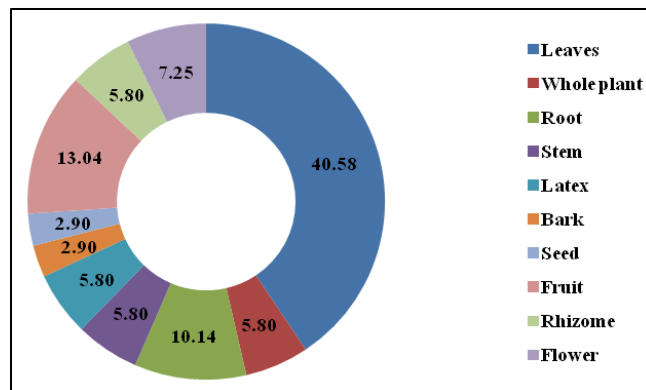


Fig 2: Types of plant parts (in %) used in Ethno-veterinary practices

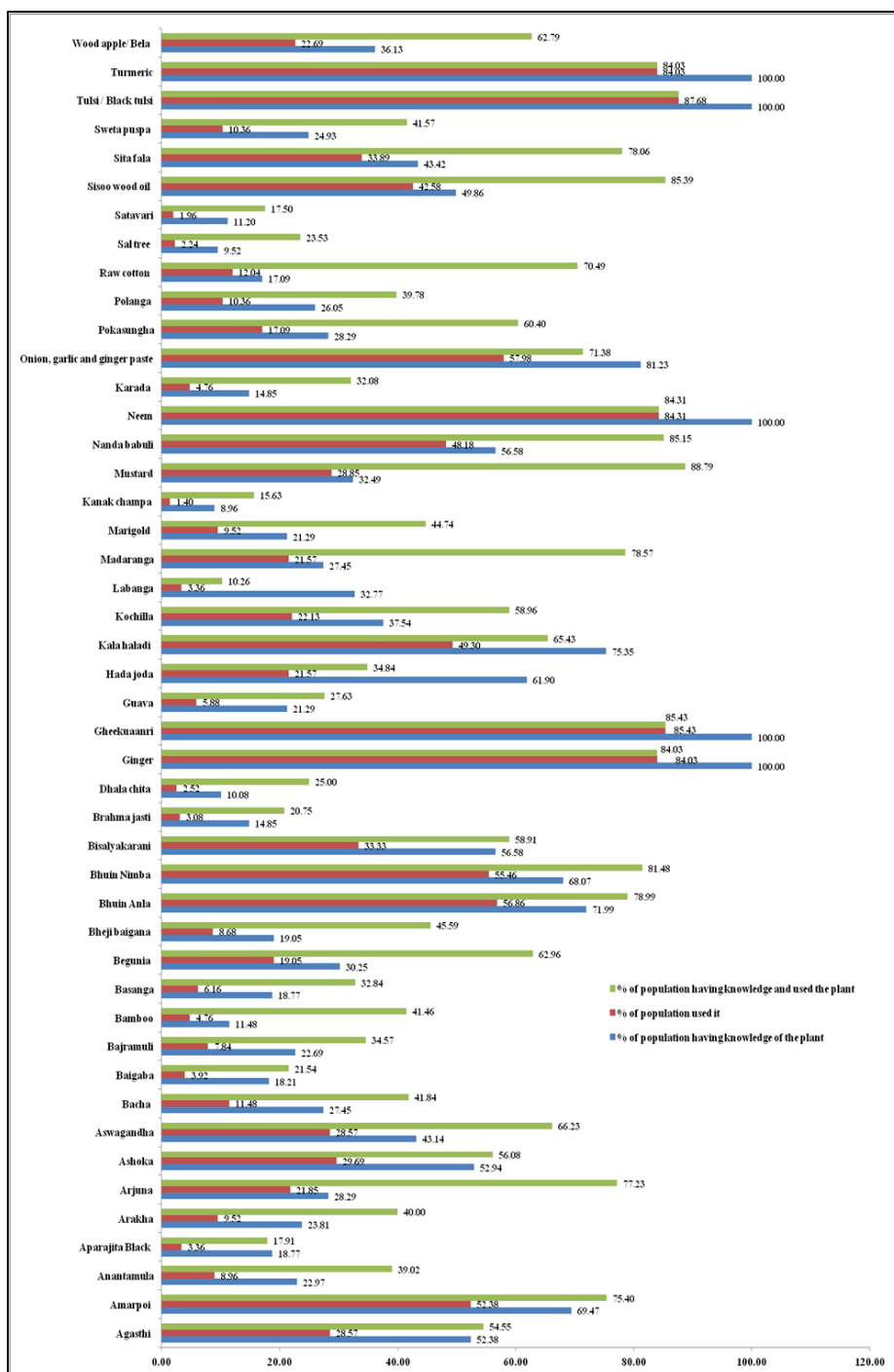


Fig 3: Chart showing Percentage (%) of surveyed population having knowledge of the medicinal plant vs Percentage (%) of surveyed population used the plant vs Percentage (%) of the known population used the plant (X – axis: % calculation, Y – Axis: Plants)

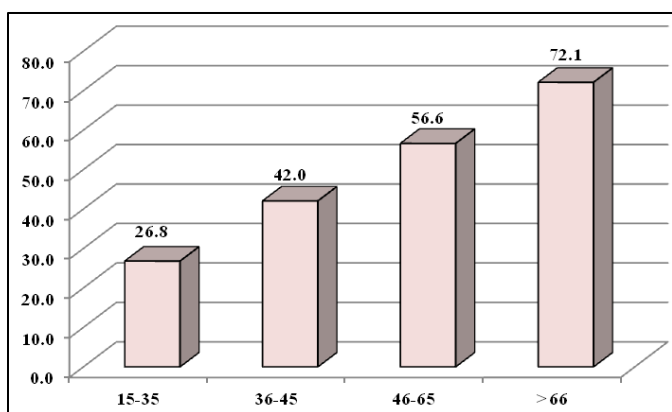


Fig 4: Data showing the extent of ethno-veterinary knowledge among different age groups (X-axis: Age group in Years, Y-axis: % of surveyed population having knowledge)

Conclusions

The present study exhibited a preliminary data on use of plants in ethno-veterinary practices. The north-eastern ghat region of the state is rich in medicinal plants which can be used for treating various ailments in livestock. The study also pointed towards first declining ancient knowledge from the population and urgent need to preserve the data from native population of eastern ghat region for countering future menace that will arise due to gruesome use of allopathic drugs in livestock.

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Conflict of Interest

The authors declare no competing or conflict of interest.

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