



Validation of ethno-veterinary medicinal practices of onion (*Allium cepa* L.)

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Onion (*Allium cepa*) is an important medicinal herb apart from its culinary uses. It has wide array of uses in ethno-veterinary medicine since long time. The study was conducted to review, document and validate the ethno-veterinary practices in which onion is a dominant constituent. The validation of the ethno-veterinary practices was done with 30 experts from the relevant scientific field. The responses of experts for validation were taken on a three-point validity continuum. Among the 58 combinations of ingredients, 27.58% scored above 120 and 55.17% were scored ranging 100 to 120 out of 150, showing their wider applicability and validity in ethno-veterinary practices. The results showed that onions have a wide array of uses in ethno-veterinary practices, ranging from treating gastro-intestinal problems like tympany, indigestion and bloat to proven insecticidal anti-parasitic, repellent and antiseptic actions with different dosage and formulations. Onion is effective on various diseases due to unique combination of different compounds including fructans, flavonoids and organosulfur compounds. Validated practices of onion in ethno-veterinary medicine may be useful particularly among poor or remote livestock rearers who can neither afford nor may access expensive or distant conventional healthcare options.

Keywords: Ethno-veterinary, Indigenous Technical Knowledge, Onion, Validation

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Traditionally onion is grown as a vegetable crop and used in daily culinary preparations. It also has an important place in the traditional medicines for herbal treatments of various human and animal diseases. The traditional knowledge of herbs and its medicinal implication has been recognized by the traditional healers through trial and error since ancient times. With rapid socio-economic, environmental as well as technological changes and advent of modern drugs, the traditional knowledge of ethno-veterinary practices is being forgotten¹. In the remote rural areas, the herdsmen do not have access to veterinary facilities. In these circumstances, ethno-veterinary medicines are the only alternative to modern veterinary treatments. Now-a-days, ethnic herbal remedies have drawn global attention due to medicinal and cost-effective implications. Many researchers have worked on documentation of Indigenous Technical Knowledge (ITKs) used for the treatment of veterinary diseases. These ITKs are the combinations of various wild medicinal plants and most of these are not readily available at home. Medicinal properties of onions have been recognized

since ancient times. Onion is instantly available in every household; it is being used as first aid in the treatment of various animal diseases in the rural area. The available literature on the ethno-veterinary medicinal uses of onion is scattered. Documentation and validation of use of onion separately or additively in ITKs will be helpful for new generation livestock rearers in prevention and curing of veterinary ailments. Thus, scientific appraisal of their uses became a prerequisite for recognition of remedial properties.

Methodology

The present investigation was undertaken to review and validate the available scattered knowledge of onion use in ethno-veterinary medicinal practices. The data available in the secondary sources were collected on ethno-veterinary uses of onion from relevant published journal articles, research reports, books and thesis. The selected uses of onion in ethno-veterinary practices were administered to the experts in the field of veterinary including researchers and field practitioners for confirming their scientific validity. Validity refers to the degree to which the data are realistic. The validation of these ethno-veterinary

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practices was done with 30 experts for their relevance in scientific scenario. The responses of experts were collected on three-point validity continuum viz., Scientifically Valid, Uncertain and Not Valid. The responses were scored 5, 3 and 1 for Scientifically Valid, Uncertain and Not Valid, respectively². Thus, one ITK could get a maximum score of 150 and a minimum of 30. The rationale was given for the use of onion against the treatment of veterinary ailment.

Results and Discussion

Onion in the ethno-veterinary medicine has been used by livestock rearers individually or additively with other natural ingredients for prevention as well as curing of various animal diseases and disorders. The important medicinal uses

of onion in ethno-veterinary practices with their validity score and rationale are presented in Table 1. The perception of the experts showed wide variation in validity of its uses on different ethno-veterinary practices. A total of 58 formulations of onion with other herbal additives have been shown with the validity scores. Among these formulations, 27.58% were claimed to have the score above 120 and 55.17% were scored between 100 to 120 out of 150, showing their wider applicability in ethno-veterinary practice and scientific validity of the uses of onion in veterinary ailment. Whereas, the ITKs claiming lower scores have been traditionally practiced in the rural areas, hence cannot be ignored and need to be further tested in order to validate their efficiency.

Table 1 — Validity and rational of ethno-veterinary use of onion by experts

| Ethno-medicinal formulation | Researcher Name, place, year | Validity | | | | Rationale |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------|----|----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | SV | U | NV | VS | |
| Dysentery | Lal (2004) | 10 | 19 | 1 | 108 | Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria and flavonoids and polyphenols) |
| Small pieces of 250 g karela (<i>Momordica charantia</i>) and 250 g onion (<i>Allium cepa</i>), feed to animals twice daily ³ . | Uttar Pradesh | | | | | |
| Grinded Onion-Bulb (<i>Allium cepa</i>) mixed with black salt and given to drink with water ⁴ . | Phondani <i>et al.</i> (2010) | 11 | 19 | 0 | 112 | |
| | Uttarakhand | | | | | |
| Diarrhoea | Kalaskar (2002) | 12 | 16 | 2 | 110 | |
| Drench mixture of owa (<i>Trachyspermum ammi</i>) and onion (<i>Allium cepa</i>) juice used to cure diarrhea ⁵ . | Maharashtra | | | | | |
| Intestinal/Endo parasite | Gupta and Patel (1993) | 12 | 16 | 2 | 110 | |
| Feeding of white onion (<i>Allium cepa</i>) (250 g) for a week along with ranbhendi (<i>Malachra capitata</i>) or sesame (<i>Sesamum indicum</i>) ⁶ . | Gujarat | | | | | |
| Ecto-parasitic infestation | Mahto (2012) | 21 | 8 | 1 | 130 | Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria), antifungal, sulfur compound-Chromium, B6, selenium, Phosphorous, calcium, magnesium, sodium, potassium |
| Application of paste of Ginger (<i>Zingiber officinale</i>) and Onion (<i>Allium cepa</i>) ⁷ . | Jharkhand | | | | | |
| Application of extract and paste of the bulbs of white onion (<i>Allium cepa</i>) on the skin after every 2-3 h and wash the body every time ⁸ . | Nirban (2006) | 17 | 12 | 1 | 122 | |
| | Maharashtra | | | | | |
| Bloat | Mahto (2012) | 23 | 7 | 0 | 136 | Antimicrobial (sulfur compound-flavonoid), Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria) |
| Feeding of mixture of Onion (<i>Allium cepa</i>), ginger (<i>Zingiber officinale</i>) and hing (<i>Ferula asafoetida</i>) ⁷ . | Jharkhand | | | | | |
| About 250 g onion (<i>Allium cepa</i>) juices, 50 g asafoetida (<i>Ferula asafoetida</i>) and 100 g salt are taken and mixed properly. It is given twice daily to the animals ⁹ . | Prasad (2004) | 21 | 9 | 0 | 132 | |
| | Uttar Pradesh | | | | | |
| A paste of 10 g asafoetida (<i>Ferula asafoetida</i>) and 200 g onions (<i>Allium cepa</i>) is prepared and given orally with 100 g kasondi (<i>Cassia occidentalis</i>) leaves to the infected animals ¹⁰ . | Siya Ram (2004) | 21 | 9 | 0 | 132 | |
| | Uttar Pradesh | | | | | |
| Make paste of asafoetida (<i>Ferula asafoetida</i>), onion (<i>Allium cepa</i>), garlic (<i>Allium sativum</i>) and ajwain (<i>Trachyspermum ammi</i>) (50 g each) and given to the affected animals ¹¹ . | Singh (2004) | 22 | 8 | 0 | 134 | |
| | Uttar Pradesh | | | | | |

(Contd.)

Table 1 — Validity and rational of ethno-veterinary use of onion by experts (Contd.)

| Ethno-medicinal formulation | Researcher Name, place, year | Validity | | | | Rationale |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------|----|----|-----|-----------------------------------------------------------------------|
| | | SV | SV | SV | SV | |
| One hundred gram mixture is made of salt, Onion (<i>Allium cepa</i>), Bakhad (<i>Musa paradisiaca</i>), Ginger (<i>Zingiber officinale</i>), bark of Aswatha (<i>Ficus religiosa</i>) and honey and then fed to the cattle for 3-4 days ¹² . | Niwas <i>et al.</i> (2013) Uttar Pradesh | 17 | 11 | 2 | 120 | |
| Use 500 g onion (<i>Allium cepa</i>), and 100 g turmeric (<i>Curcuma longa</i>) mixed with sufficient amount of lassi (curd) ¹³ . | Verma (2003) Himachal Pradesh | 12 | 15 | 3 | 108 | |
| Crushed 100 g onion bulb (<i>Allium cepa</i>), mixed with 250 g mustard (<i>Brassica nigra</i>) oil and given orally 2-3 times a day ¹⁴ . | Ali (2003) Uttar Pradesh | 17 | 13 | 0 | 124 | |
| Rumination Kalajeere (<i>Carum persicum Boiss.</i>) + Coriander (<i>Coriandrum sativum</i>) + Jaggery + Onion (<i>Allium cepa</i>) + Curd ¹⁵ . | Subrahmanyeswari & Chander (2013) Uttarakhand | 18 | 10 | 2 | 122 | Antimicrobial (sulfur compound - flavonoids) antioxidant (quercetin) |
| Constipation A mixture of onion (<i>Allium cepa</i>) juice and jaggery was administered to cattles ¹⁶ . | Koradia (1999) Gujarat | 15 | 14 | 1 | 118 | |
| Gastric trouble Prepare paste of 10 g onion (<i>Allium cepa</i>), 10 g black pepper (<i>Piper nigrum</i>) and mustard (<i>Brassica nigra</i>) oil. This dose is given twice a day to control gastric trouble ¹⁷ . | Singh (2004) Uttar Pradesh | 14 | 16 | 0 | 118 | |
| Gastric problem For the treatment of gastric problem, a paste is prepared by mixing 10 g nausagar (Ammonium chloride), 5 g black pepper (<i>Piper nigrum</i>) 250 g onion (<i>Allium cepa</i>) and 250 g desi ghee. This paste is given 2-3 times daily to the animal ¹⁸ . | Lal (2004) Uttar Pradesh | 16 | 13 | 1 | 120 | |
| Digestion Onion (<i>Allium cepa</i>) 500 g, Ajwain (<i>Trachyspermum ammi</i>) 25 g and black salt 25 g are powdered and mixed in one litre of water ¹⁹ . | Seeralan (2004) Tamil Nadu | 17 | 12 | 1 | 122 | |
| Loss of appetite Mixture of Coriander (<i>Coriandrum sativum</i>) + onion (<i>Allium cepa</i>) + kalajeere (<i>Carum persicum Boiss.</i>) + curd or kalajeera + coriander (<i>Coriandrum sativum</i>) juice is fed to animal. ¹⁵ | Subrahmanyeswari & Chander (2013) Uttarakhand | 19 | 9 | 2 | 124 | |
| Stomach pain Preparation of laddu with the mixture of onion (<i>Allium cepa</i>), jaggery and jowar (<i>Sorghum bicolor</i>) ²⁰ | De <i>et al.</i> (2004) West Bengal | 13 | 16 | 1 | 114 | |
| Indigestion /gas Onion (<i>Allium cepa</i>) bulbs are mashed and the paste is fed to animal ²¹ . | Jain and Shrivastav (1999) Madhya Pradesh | 15 | 14 | 1 | 118 | |
| Bark of shisham (<i>Dalbergia sissoo</i>) + owa (<i>Trachyspermum ammi</i>) + pod cover of wal (<i>Lablab purpureus</i>) + onion (<i>Allium cepa</i>) scale mixture is fed to animal ⁸ . | Nirban (2006) Maharashtra | 13 | 17 | 0 | 116 | |
| Indigestion/Tympany 25 g extract of onion (<i>Allium cepa</i>) and owa (<i>Trachyspermum ammi</i>) 25 g ⁸ . | Nirban (2006) Maharashtra | 19 | 11 | 0 | 128 | Antimicrobial (sulfur compound – flavonoids) |
| Leaves of pangara (<i>Erythrina variegata</i>) + owa (<i>Trachyspermum ammi</i>) + onion (<i>Allium cepa</i>) ⁸ . | Nirban (2006) Maharashtra | 17 | 13 | 0 | 124 | |

(Contd.)

Table 1 — Validity and rational of ethno-veterinary use of onion by experts (Contd.)

| Ethno-medicinal formulation | Researcher Name, place, year | Validity | | | | Rationale |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------|----|----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | SV | SV | SV | SV | |
| Tympany Feeding of onion (<i>Allium cepa</i>) (500 g), Ajwain (<i>Trachyspermum ammi</i>) (25 g), black salt (25 g) or molasses (250 g) and soda (25 g) ²² . | De (1994) West Bengal | 21 | 9 | 0 | 132 | |
| Mixture of kneaded wheat flour, ajwain (<i>Trachyspermum ammi</i>), fenugreek (<i>Trigonella foenum-graecum</i> L.), jaggary, onion (<i>Allium cepa</i>), asafoetida (<i>Ferula asafoetida</i>), garlic (<i>Allium sativum</i>) and turmeric (<i>Curcuma longa</i>) were mixed together and fed to the animal ²³ . | Kanwar and Yadav (2005) Himachal Pradesh | 15 | 15 | 0 | 120 | |
| Flatulence A mixture of whey milk, onion (<i>Allium cepa</i>) and leaves of sitaphal (<i>Annona squamosa</i>) is given to suffering animal ²⁴ . | Gupta and Patel (1992) Gujarat | 18 | 11 | 1 | 124 | |
| Mixture of ajma (100 g), onion (<i>Allium cepa</i>) (200 g) and aerial root of banyan tree (<i>Ficus benghalensis</i>) is fed to the animal ²⁴ . | Gupta and Patel (1992) Gujarat | 18 | 11 | 1 | 124 | |
| The suspension of onion (<i>Allium cepa</i>) and turmeric (<i>Curcuma longa</i>) powder in equal quantity in whey milk is given to the animal ²⁴ . | Gupta and Patel (1992) Gujarat | 18 | 11 | 1 | 124 | |
| Respiratory diseases/ asthma Storage tissue of ashwagandha (<i>Withania somnifera</i>), leaves of pandhari tilvan (<i>Gynandropsis pentaphylla</i>), stem of veldt grape (<i>Cissus quadrangularis</i>), white onion (<i>Allium cepa</i>), pepper (<i>Piper nigrum</i>) and ginger (<i>Zingiber officinale</i>) are cut into small pieces and filled in an earthen pot. The mouth of the pot is then tied tightly and placed inside the manure pit. After a few days, the pot is removed and the fermented decoction is mixed with same quantity of butter milk. A litre of this mixture is given to the affected animal ²⁵ . | Prakash (1997) Gujarat | 12 | 16 | 2 | 110 | Anti-asthmatic (thio-sulfonates (sulfur compounds)), anti-inflammatory (active components called iso thiocyanates, quercetin and other flavonoids found in onions) |
| Ginger (<i>Zingiber officinale</i>) + sunth (<i>Zingiber officinale</i>) (dried ginger powder) + white onion (<i>Allium cepa</i>) + khaskhas (<i>Papaver somniferum</i>) + seeds of kali miri (<i>Piper nigrum</i>) + garlic (<i>Allium sativum</i>) + leaves of Menaki (<i>Gymnema sylvestris</i>) + leaves of narayan makadi (<i>Paramigniya monophylla</i>) + leaves of bendurli (<i>Dendrophthoe falcata</i>). Extract of above ingredients (50-100 g each) was drenched twice or thrice / day for 4-5 days ⁸ . | Nirban (2006) Maharashtra | 16 | 12 | 2 | 118 | |
| Turmeric (<i>Curcuma longa</i>) + white Onion (<i>Allium cepa</i>) + owa (<i>Carum copticum</i>) + bulb of garlic (<i>Allium sativum</i>). The extract of all the ingredients (20-25 g each) was drenched daily twice-thrice for two days ⁸ . | Nirban (2006) Maharashtra | 16 | 12 | 2 | 118 | |
| Pleuropneumonia Garlic (<i>Allium sativum</i>) or onion (<i>Allium cepa</i>) bulblets are fed ²¹ . | Jain and Shrivastav (1999) Madhya Pradesh | 8 | 19 | 3 | 100 | Anti-inflammatory (active components called iso thiocyanates, quercetin and other flavonoids found in onions) |
| Prolapsed Ten kg onion (<i>Allium cepa</i>) to eat when it is not carrying ¹⁶ . | Koradia (1999) Gujarat | 8 | 19 | 3 | 100 | Anti-inflammatory properties. Quercetin is a flavonoid, antioxidant (quercetin) |

(Contd.)

Table 1 — Validity and rational of ethno-veterinary use of onion by experts (Contd.)

| Ethno-medicinal formulation | Researcher Name, place, year | Validity | | | | Rationale |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------|----|----|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | SV | SV | SV | SV | |
| Uterus is washed with juice extracted from fresh onion (<i>Allium cepa</i>) by chopping and pounding and carefully pushed back into placed ⁶ . | Gupta and Patel (1993) Gujarat | 5 | 21 | 4 | 92 | |
| Urinary problem like oliguria, anuria White onion (<i>Allium cepa</i>) bulbs were fed ⁸ . | Nirban (2006) Maharashtra | 10 | 18 | 2 | 106 | Antimicrobial (sulfur compound- Chromium, B6, selenium, Phosphorous, calcium, magnesium, sodium, potassium) |
| Fertility One kg of onions (<i>Allium cepa</i>) mixed with salt and given to animals on monthly basis for increasing fertility ²⁶ . | Shubeena <i>et al.</i> (2018) Central Kashmir | 11 | 17 | 2 | 108 | Antimicrobial (sulfur compound – flavonoids) |
| Poisoning Onion-Bulb (<i>Allium cepa</i>) is grinded and mixed with black salt and allowed to drink with water ⁴ . | Phondani <i>et al.</i> (2010) Uttarakhand | 8 | 21 | 1 | 104 | Antimicrobial (sulfur compound – flavonoids) |
| Foot and Mouth Onion-Bulb (<i>Allium cepa</i>) is grinded and mixed with black salt and allowed to drink with water ⁴ . | Phondani <i>et al.</i> (2010) Uttarakhand | 6 | 20 | 4 | 94 | Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria) |
| Tail gangrene Bark of Beheda (<i>Terminalia bellirica</i>) + bark of gulaamba (<i>Persea macrantha</i>) + veldt grape (<i>Cissus quadrangularis</i>) + aale (<i>Zingiber officinale</i>) + white onion (<i>Allium cepa</i>) + cumin seeds (<i>Cuminum cyminum</i>) + leaves of panfuti (<i>Kalanchoe pinnata</i>) + leaves of gudmar (<i>Gymnema sylvestris</i>) + bark of kaundal (<i>Trichosanthes palmata</i>) + owa (<i>Carum copticum</i>) + coconut (<i>Cocus nucifera</i>) milk. Before feeding this medicine, cashew (<i>Anacardium occidentale</i>) liquor was drenched ⁸ . | Nirban (2006) Maharashtra | 4 | 22 | 4 | 90 | Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria) |
| Cold, cough and fever About 5 g aniseed (<i>Pimpinella anisum</i>), one bulb of garlic (<i>Allium sativum</i>), one onion (<i>Allium cepa</i>), two tablespoonful salt are ground and mixed in mustard (<i>Brassica nigra</i>) oil and then it is fed to ailing animals twice a day i.e., in morning and evening ²⁷ . | Kumar (2003) Bihar | 10 | 19 | 1 | 108 | Anti-inflammatory (active components called iso thiocyanates, quercetin and other flavonoids found in onions), antiviral (sulfur compound), sulfur compound- Chromium, B6, selenium, Phosphorous, calcium, magnesium, sodium, potassium) |
| Cold and fever Leaves cover of Wal (<i>Psophocarpus tetragonolobus</i>) pods + Onion (<i>Allium cepa</i>) + Garlic (<i>Allium sativum</i>) + Triphala (<i>Zanthoxylum alatum</i>) + fruits of chillies (<i>Capsicum annum</i>) ⁸ . | Nirban (2006) Maharashtra | 10 | 19 | 1 | 108 | |
| Bark of shishum (<i>Dalbergia latifolia</i>) + scales of onion (<i>Allium cepa</i>) + owa (<i>Carum copticum</i> L.) + scales of garlic (<i>Allium sativum</i>) ⁸ . | Nirban (2006) Maharashtra | 7 | 22 | 1 | 102 | |
| Fever A mixture is prepared by mixing 20 g each of onion (<i>Allium cepa</i>) and garlic (<i>Allium sativum</i>) and 5 g timber (<i>Zanthoxyleum alatum</i>) with 20 g wheat flour and 10 g molasses. Round balls are prepared by this mixture and fed to the affected animals ²⁸ . | Verma (2004) Himachal Pradesh | 13 | 16 | 1 | 114 | |
| Onion (<i>Allium cepa</i>) juice along with raw liquor ²⁹ . | Das <i>et al.</i> (2003) Uttar Pradesh | 7 | 21 | 2 | 100 | |

(Contd.)

Table 1 — Validity and rational of ethno-veterinary use of onion by experts (Contd.)

| Ethno-medicinal formulation | Researcher Name, place, year | Validity | | | | Rationale |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------|----|----|-----|-------------------------------------------------------------------------------------------------------------------------|
| | | SV | SV | SV | SV | |
| Insect bites Onion (<i>Allium cepa</i>) bulb paste applied to relieve pain ³⁰ . | Mishra (2013) Orissa | 12 | 16 | 2 | 110 | Antimicrobial (organosulfur compound) |
| Warts Clean onion (<i>Allium cepa</i>) and ginger (<i>Zingiber officinale</i>) in equal quantity are thoroughly ground to make paste and applied over the growth 4-5 times a day ³¹ . | Mony (2003) Kerala | 9 | 20 | 1 | 106 | Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria), antifungal |
| Sickness or weakness All the cattle (both healthy and sick once) are fed with 200 g mixture of onion (<i>Allium cepa</i>), bibba seed (<i>Semecarpus anacardium</i>) and sal leaves (<i>Shorea robusta</i>) after all the agricultural work in fields requiring the help of cattle has been accomplished ³² . | Murmu (2003) Jharkhand | 6 | 23 | 1 | 100 | Antimicrobial (sulfur compound - flavonoids) |
| Calcium deficiency and overall weakness after delivery 300 g bulbs of onion (<i>Allium cepa</i>) are given orally to cattle once in a day for 7-10 days ^{32,33} . | Galav <i>et al.</i> (2013) Rajasthan | 9 | 21 | 0 | 108 | Rich calcium and riboflavin |
| Bone fracture In this practice, paste of bark of pojo tree (<i>Litsea monopetala</i> (Roxb.) pers.), chandrasur (<i>Lepidium sativum</i>), brown salt, onion (<i>Allium cepa</i>), garlic (<i>Allium sativum</i>) and hadjod (<i>Cissus quadrangularis</i>) leaves are applied on and around the broken bone ³⁴ . | Jha (2003) Jharkhand | 7 | 20 | 3 | 98 | Antioxidant (quercetin) and anti-inflammatory (flavonoids) properties. |
| Jaundice Use paste of castor (<i>Ricinus communis</i>) tender leaves, black pepper (<i>Piper nigrum</i>) and small onions (<i>Allium cepa</i>) is fed in empty stomach to the livestock ³⁵ . | Majhi (2008) Maharashtra | 12 | 15 | 3 | 108 | |
| Wound Application of poultice of Onion (<i>Allium cepa</i>) with mustard oil ⁷ . | Mahto (2012) Jharkhand | 12 | 15 | 3 | 108 | Antibacterial (Onion contains thiosulphinate, a compound that is effective in killing many common bacteria), antifungal |
| Animal discharges foam from mouth and walks lamely Crushed onion (<i>Allium cepa</i>) is given to animals and ash is applied on the wound of hoof ³⁶ . | Dhani (2003) Himachal Pradesh | 9 | 19 | 2 | 104 | |
| Cattle suffering from luhaknad (swelling of neck region) Mixture of wheat flour, onion (<i>Allium cepa</i>), aloochi paane (<i>Colocasia esculenta</i>) and butter are given to the cattle ³⁷ . | Kumar (2003) Himachal Pradesh | 6 | 20 | 4 | 94 | Anti-inflammatory (active components called iso thiocyanates, quercetin and other flavonoids found in onions) |
| Onion juice (<i>Allium cepa</i>) is applied over affected area ²⁹ . | Das <i>et al.</i> (2003) Uttar Pradesh | 8 | 20 | 2 | 102 | |
| Yoke gall Two hundred gram of onion (<i>Allium cepa</i>) peels: burn and mix the ash with butter and apply ³⁸ . | Patel <i>et al.</i> (1997) Gujarat | 12 | 15 | 3 | 108 | Antibiotics and anti-inflammatory |
| Onion roots (<i>Allium cepa</i>) are burnt and the ash is mixed with butter and applied on the yoke gall ³⁹ . | Bavin <i>et al.</i> (2003) Tamil Nadu | 15 | 13 | 2 | 116 | |
| Limping in cattle Application of paste of cow dung and onion (<i>Allium cepa</i>) mud over affected part ²⁹ . | Das <i>et al.</i> (2003) Uttar Pradesh | 7 | 19 | 4 | 96 | Antibiotic |

Note: SV- Scientifically Valid, U- Uncertain, NV-Not valid, VS-Validity Score

The results showed that onions (*Allium cepa*) have a wide array of uses in ethno-veterinary practices, ranging from treating gastro-intestinal problems (i.e., tympany, indigestion, bloat) to proven insecticidal, repellent, antiparasitic and antiseptic actions. The methods of dosage or administration of formulations of onion-based remedies are varying from individual to mixture of different herbal ingredients. Scientific evidences are found regarding the use of *Allium* species as anti-protozoal agents against *Giardia lamblia*, *G. intestinalis*, *Entamoeba histolytica*, *Trichomonas vaginalis* and different strains of *Leishmania*,⁴⁰, antifungal use due to activity against *Candida*, *Trichophyton*, *Torulopsis*, *Rhodotorula*, *Cryptococcus*, *Aspergillus* and *Trichosporon*^{40,41} and as an antibacterial use against *Pseudomonas*, *Proteus*, *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella*, *Salmonella*, *Micrococcus*, *Bacillus subtilis*, *Mycobacterium* and *Clostridium*⁴². Evidence from several investigations suggested that the biological and medical functions of onions are mainly due to unique combination of three families of compounds—fructans, flavonoids and organosulfur compounds⁴³. The biological effects of additional constituents of onion, such as lectins; prostaglandins; fructan; pectin; adenosine; vitamins B1, B2, B6, C and E; biotin; nicotinic acid; fatty acids, glycolipids; phospholipids; and essential amino acids, have been studied for over several decades. Some proteins, saponins and phenolic compounds of onions also contribute to their pharmacological activity⁴⁴. Due to these various properties of the onion, it has been used in traditional veterinary medicine to cure the various ailments such as cough, cold, fever, dysentery, diarrhea, endo- & ectoparasites, yoke gall, flatulence, respiratory problems, urinary problems, gastric and digestive problems.

In the modern era, use of chemical drugs has increased which involve high cost, side effects, increase in drug resistance and these medicines are not readily available in rural areas. Benefits of therapeutic properties of herbal medicinal plants like onion can be easily harnessed if it is known to farmers in rural areas. Particularly among poor or remote livestock rearers who can neither afford nor may access expensive or distant conventional healthcare options, validated ethno-veterinary may be the most realistic choice⁴⁵. Traditional knowledge of the ethno-veterinary usage of onion needs to be conserved through documentation and validation. It can act as first aid for animal health in combination with other

ingredients for prevention and treatment of various animal diseases. Efforts should be made to popularize the ITKs which have a high level of validity scores by the extension agents to conserve the traditional wealth and reduce the expenditure on veterinary treatments. The medicinal preparations of onion in combination with other herbs in suitable dosage need to be standardized further in the laboratory testing and should be popularized for home remedies against different animal diseases.

Conclusion

Along with the culinary usage, traditionally onion has been recognized for its medicinal value. India is the largest producer of onion in the world and onion is part and parcel of kitchen in every household confirms its widespread availability. This study provided an inventory of medicinal uses of onion in ethno-veterinary practices against different diseases. Documented onion uses in ethno-veterinary practices and their perceptual validation can be further tested in laboratories for use in different combinations with other herbal ingredients against animal diseases. Dissemination of traditional knowledge after validation among the livestock rearers can help to reduce the cost as well as instant treatment or prevention of many animal diseases.

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Conflict of interest

Authors declare no conflict of interest.

Authors' contributions

R B K & S S G: Conceptualization, design, drafting; R B K & A O P: Survey and analysis; K J, V M & M S: drafting, review & editing

References

- 1 Hussain A, Khan M N, Iqbal Z & Sajid M S, An account of the botanical anthelmintics used in traditional veterinary practices in Sahiwal district of Punjab, Pakistan, *J Ethnopharmacol*, 119 (1) (2008) 185–190.
- 2 Ponnusamy K, Gupta J & Nagarajan R, Indigenous Technical Knowledge (ITK) in dairy enterprise in coastal Tamil Nadu, *Indian J Tradit Know*, 8 (2) (2009) 206–211.
- 3 Lal M, Cure of dysentery in animals by using *karela* and onion, *Veterinary Science and Animal Husbandry, Inventory of Indigenous Technical Knowledge in Agriculture -*

- Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004,137.
- 4 Phondani P C, Maikhuri R K & Kala C P, Ethnoveterinary uses of medicinal plants among traditional herbal healers in Alaknanda catchment of Uttarakhand, India, *Afr J Tradit Complement Altern Med*, 7 (3) (2010) 195-206.
 - 5 Kalaskar A P, *Study on Documentation of Indigenous Farm Technological Knowledge and its Adoption by the Tribal Farmers*, (Ph.D thesis, Marathwada Agricultural University, Parbhani) 2002.
 - 6 Gupta A K & Patel K K, Survey of farmers innovations in Gujarat, Part V, *Honey bee*, 4 (1) (1993) 19.
 - 7 Mahto V K, Study on Indigenous Technical Knowledge (ITK), In: *Animal Husbandry Among Livestock Owners Of Jharkhand*, (Ph.D Thesis, Birsa Agricultural University, Ranchi, Jharkhand), 2012.
 - 8 Nirban A, *A study on indigenous technical knowledge about rice cultivation and bovine health management practices in Konkan region of Maharashtra*, (Ph.D Thesis, University of Agricultural Sciences, Dharwad), 2006.
 - 9 Prasad R, Treatment of afara in animals with onion and asafoetida, *Inventory of Indigenous Technical Knowledge in Agriculture - Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004,149.
 - 10 Siya Ram, Treatment of afara in animals by using a mixture of kasondhi leaf, asafoetida and onion, *Inventory of Indigenous Technical Knowledge in Agriculture - Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004,152.
 - 11 Singh R, Treatment of afara in animals with asafoetida, onion, garlic and ajwain, *Inventory of Indigenous Technical Knowledge in Agriculture - Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004,153.
 - 12 Niwas R, Singh Dinker, Yadav S M & Balai L P, Traditional wisdom for diseases treatment in animal husbandry, *Popular Kheti*, 1 (2) (2013) 30-38.
 - 13 Verma D R, Treatment for afara, Veterinary and Animal Husbandry, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 357.
 - 14 Ali S M, Treatment for bloat in cattle and buffalo, Veterinary and Animal Husbandry, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 361.
 - 15 Subrahmanyeswari B & Chander M, Integrating indigenous knowledge of farmers for sustainable organic farming: An assessment in Uttarakhand State of India, *Indian J Tradit Know*, 12 (2) (2013) 259-264.
 - 16 Koradia D, Survey of grassroot innovations. Part XXVI, *Honey Bee*, 10 (1) (1999) 13.
 - 17 Singh I, Treatment of gastric trouble in cattles, *Inventory of Indigenous Technical Knowledge in Agriculture - Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004,147.
 - 18 Lal C, Treatment of gastric trouble in animals by using black pepper, onion, nausadar and ghee, *Inventory of Indigenous Technical Knowledge in Agriculture - Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004,147.
 - 19 Seeralan S, *Documentation and Validation of Indigenous Technical Knowledge Of Animal Husbandry in Sivaganga District (T.N.)*, (M.Sc thesis, The National Dairy Research Institute, Karnal (Deemed University)), 2004.
 - 20 De Amitendu, H P S Arya, Tudu Babulal & Goswami A Indigenous technical knowledge in animal husbandry, *Livestock Res Rural Dev*, 16 (8) (2004).
 - 21 Jain & shrivastav, *Ethnobotanical Approach in evaluation of ethnoveterinary practices*, ICAR Summer Short Course entitled "Techniques for scientific validation and evaluation of ethno veterinary practices". Aug 3-12, Division of Medicine, IVRI, Izatnagar, (1999) 28-33.
 - 22 De H K, Identification and assessment of indigenous technologies in Animal Husbandry in Bankura district (West Bengal), (M.Sc. Thesis, NDRI (Deemed Univ.), Karnal, India.), 1994.
 - 23 Kanwar P & Yadav D, Indigenous animal healthcare practices of Kangra District, Himachal Pradesh, *Indian J Tradit Know*, 4 (2) (2005) 164-168.
 - 24 Gupta A K & Patel K K, Survey of farmers' innovations in Gujarat. Part III, *Honey Bee*, 3 (2) (1992) 22.
 - 25 Prakash TN, Mimoso restores uterus and cashew increases biogas, *Honey Bee*, 8 (3) (1997) 8.
 - 26 Shubeena S, Hai A, Hamdani S & Akand A, Indigenous Technical Knowledge (ITKs) used by farmers of central kashmir to increase production and reproduction in livestock, *Int J Livestock Res*, 8 (8) (2018) 294-302.
 - 27 Kumar A, Treatment of cold, cough and fever in animals through use of aniseed garlic and onion, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 368.
 - 28 Verma L R, Use of onion and garlic as treatment of cattle against fever, *Inventory of Indigenous Technical Knowledge in Agriculture - Document 2*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2004, 240.
 - 29 Das P, Das S K, Arya H P S, Singh R P, Mishra A, *et al.*, Inventory of Indigenous Technical Knowledge in Agriculture - Document 2, ICAR New Delhi 2003, 680.
 - 30 Mishra D, Cattle wound and ethanoveternairy medicine: A study in Polasara block Ganjam district, Orissa, *Indian Res J Ext Edu*, 12 (1) (2013) 62-65.
 - 31 Mony G, Control of warts in cattle, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 336.
 - 32 Murmu C, Preventive medicine for cattle, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and

- H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 338.
- 33 Galav P, Anita Jain & S S Katewa, Ethenoveternairy medicines used by tribals of Tadgarh –Raoli wildlife sanctuary Rajasthan,India, *Indian J Tradit Know*, 12 (1) (2013) 56-61.
- 34 Jha R K, Cure of bone fracture in animals by herbal treatment, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 342.
- 35 Majhi, S K, Indigenous technical knowledge for control of insect pest and livestock disorders. *Indian J Tradit Know*, 7 (3) (2008) 463-465.
- 36 Dhani C R, Traditional method of treatment of animals, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma and H P S Arya, *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 442.
- 37 Kumar R, Treatment of cattle suffering from luha knad, edited by P Das, S K Das, G Subba Reddy, L R Verma & H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 447.
- 38 Patel K K, Suthar J H, Koradia D, Raval A, Srinivas C H, *et al.*, Survey of grassroot innovations, Part XX. *Honey Bee*, 8 (3) (1997) 13.
- 39 Bavin, Reslin, Selvin & Radhakrishnan T, Curing yoke galls of bullocks, Veterinary and Animal Husbandry, In: *Inventory of indigenous Technical Knowledge in Agriculture*, edited by P Das, S K Das, G Subba Reddy, L R Verma & H P S Arya *et al.*, (Division of Agricultural Extension, ICAR, New Delhi), 2003, 403.
- 40 Lun Z, Burri C, Menzinger M, *et al.*, Antiparasitic activity of diallyl trisulfide (Dasuansu) on human and animal pathogenic protozoa (*Trypanosoma sp.*, *Entamoeba histolytica* and *Giardia lamblia*) in vitro, *Ann Soc Belge Med Trop*, (74) (1994) 51.
- 41 Davis S R & Perrie R, The in-vitro susceptibility of *Cryptococcus neoformans* to allitridium. In *program and Abstracts of the 15th Congress of ISHAM* (abstract 113), San Antonio, TX, May 25-29, 2003.
- 42 Delaha E C & Garagusi V F, Inhibition of mycobacterial by garlic extract (*Allium sativum*), *Antimicrob Agents Chemother*, (27) (1985) 485.
- 43 Fenwick G R & Hanley A B, The genus *Allium*, *Crit Rev Food Sci Nutr*, (22) (1985) 199.
- 44 Griffiths G, Trueman L, Crowther T *et al.*, Onions – a global benefit to health, *Phytother Res*, (16) (2002) 603.
- 45 Ponnusamy K, Kale R B, Ravi K N, Arulmozhi D M C & Sharma P, Cross-regional analysis on usage of indigenous technical knowledge in dairy farming, *Indian J Anim Res*, (51) (2017) 549-556.