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A comparative study of traditional knowledge of *Calotropis procera* and *Calotropis gigantea* among four villages of Jaipur district of Rajasthan

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Abstract

An ethnobotanical survey through person to person contact was conducted in four villages of Jaipur district of Rajasthan, India to assess the extent of traditional knowledge about medicinal uses of *Calotropis procera* and *Calotropis gigantea* amongst rural folks. During survey medicinal uses from previous documented literature were discussed with villager informants comprised of heterogenous group with respect to sex, qualification and age. Information was gathered in a designed format and PCTK scoring (Person's Carrying Traditional Knowledge) was calculated. On the basis of PCTK %age scoring and number of medicinal uses narrated/village, both the species were compared. It was found that ethnomedicinal knowledge was highly degraded in *Calotropis gigantea* as there was no single informant to narrate its traditional use indicating thereby high level TK degradation.

Keywords: *Calotropis procera*, *Calotropis gigantea*, Ethnomedicinal value, Person's carrying traditional knowledge (PCTK), Traditional knowledge (TK)

1. Introduction

India is a country that produces the largest medicinal herbs therefore it is called Botanical garden of the world. Plants are the primary source for natural products and have been for their remedial properties by rural as well as urban communities. In the current scenario, nearly about 80% of world population directly depends over wildy growing plants having therapeutic potential^[1] while in India approximately 65% of the human population relying on over 43% flowering plants endowed with medicinal properties^[2].

According to documented data, there are about 45000 floral species present in India out of which 3000 plant species are used for therapeutic potential but more than 6000 are used by traditional practitioners^[3]. Many plants and their formulation are directly used for therapeutics by the greater number of communities all over the world and have lesser side effects in comparison to allopathy^[4].

Due to lack of specific study and awareness, people at the selected sites are unable to derive full benefits from this ancient and reliable therapeutic system. In this regard by the help of regional people, folks in strengthening TK input, practice and knowledge about herbals is very important. This knowledge is needed to be conserved and documented. *Calotropis* plant in wild locations is facing threat of extinction due to ignorance and various mismanagement actions of human beings. The documentation of ethnobotanical knowledge is essential for species protection and sustainable use of resources. Besides such types of studies are often meaningful in revealing locally important plant species, sometimes pointing to the discovery of raw medications as well^[5].

Traditional knowledge or ethnomedicinal helps poor communities living in primitive, tribal areas to make effective use of herbals for human and cattle^[1]. The term ethnobotany is used for the traditional knowledge and firstly this term was given by Hershberger in 1895. Ethnobotany shows the dependence of people over the plants or also indicates the way of the utilization of local growing plants by indigenous people from prehistoric time^[6]. The trial and error method has been used to accumulate traditional knowledge by the old generation and communicated through oral means to young generations. Ethnobotanical information provides knowledge about several active compounds which are screened and extracted from different plants to be used as potent drug molecules^[7].

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The reliable reservoir pool for TK is usually available in the form of old Vedic Granth's, books, journals and recently internet etc. In addition, TK in past and present is transmitted from generation to generation and person to person also. Research methodology for accumulation of TK varies from laboratory to laboratory or researcher to researcher and final conclusion is deduced on the basis of documented information. Over the years TK of therapeutic significance has been accumulated but the knowledge in the use and practice is reducing day by day. In order to have an insight into the factors affecting the loss of transmittance of TK and to collect any novel therapeutic reporting through personal contact with the rural people a survey was conducted.

Traditional knowledge from ancient times has been conserved through electronic documentation and conserved by TKDL (Traditional Knowledge Digital Library). In rural areas, traditional knowledge is conserved because there is a lack of health facilities as compared to urban areas where modern health facilities are available. (8) Authors have tried to explore the extent to which the TK of *Calotropis* spp. has been conserved in rural areas of Jaipur district through field survey in Jaipur district of Rajasthan. The present study will help to improve ethno medicinal knowledge and will also share the importance of medicinal plants by the socioeconomic setup.

Calotropis species in one of the most widely known therapeutic plant species to milkweed family Asclepiadaceae due to secretion of milk sap [9]. In this family order Gentianales contain flowering plants more than 280 genera and 2000 species of shrubs climbers, torrid herbs, rarely shrubs and trees [10]. This genus includes mainly two species i.e. *Calotropis procera* and *Calotropis gigantea* which are commonly utilized not only in Indian but also in Unani, Arabic and Sudanese medicinal system [11].

Calotropis spp. is one of the plants by widely worshipped by people and these plants are conserved as a genetic resource and used as food, fertilizer, fodder and in every other way. *Calotropis* spp. is one of them. *Calotropis procera* is known as "Raktha Arka" and *Calotropis gigantea* as "Sweta Arka" in ayurvedic medicine [12].

Different parts of *Calotropis procera* like leaves, bark, stem, root, flower, fruit and most important latex have been enriched with different phytochemicals such as calotropin, calotropagenin, calotoxin, calactin, uscharin, amyirin, amyirin esters, frugoside, voruscharine and corotoxigenin with different pharmacological activities which are used in different therapeutic treatment [13]. On the other hand, many previous workers have reported the religious as well as a medicinal value of *Calotropis gigantea* because of the presence of many types of phytoconstituents like alkaloids,

glycosides, phenolic compounds, flavonoids, saponins, sterols, resins, carbohydrate, proteins and amino acid [14].

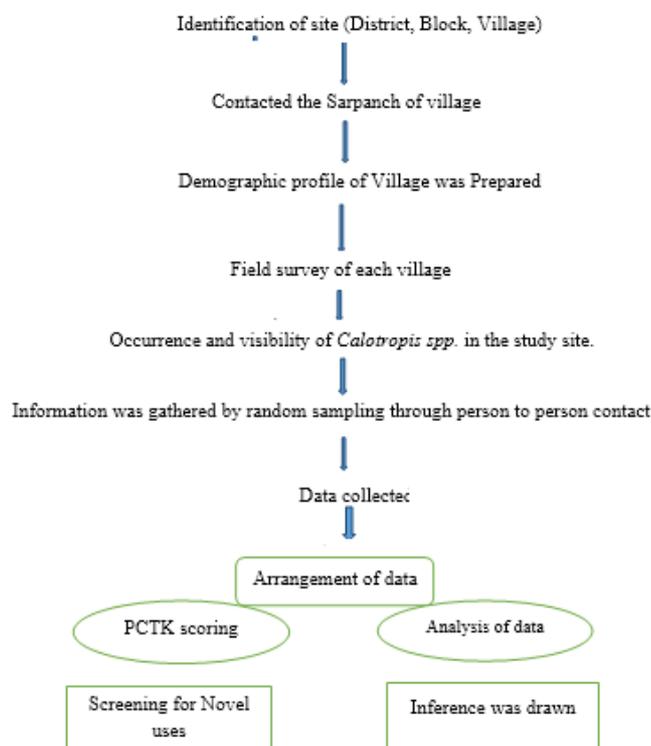
2. Materials and Methods

An ethnobotanical format was designed in lab with significant informative features relating to traditional medicinal knowledge in our society [6]. Selection of sites and sampling was done randomly from four villages i.e. Chimanpura, Bakhrana, Kharab and Banethi of Jaipur districts of Rajasthan state in India were selected.

2.1 Design of format

2.1.1 Format includes two parts

1. Socio-economic profile of the person which include personal details of an individual like age, sex, qualification, occupation, address etc.
2. Knowledge regarding the medicinal plant in which medicinal uses of plants and their side effects, plantation (wild/cultivated), level of information, domain of diffusion, status of knowledge was included.



2.2 Our survey was done under following steps

Table 1a: Showing the % PCTK score strength in *Calotropis procera*.

| Sr. No. | Ethnomedicinal uses | PCTK % | Traditional knowledge existed |
|---------|-----------------------|--------|-------------------------------|
| 1. | Thorn removal | 44.77 | Yes |
| 2. | To cure joint pain | 19.40 | Yes |
| 3. | To cure boils | 16.41 | Yes |
| 4. | To cure asthma | 14.92 | Yes |
| 5. | To cure fever | 8.9 | Yes |
| 6. | To cure itching | 5.97 | Yes |
| 7. | To cure insect biting | 4.47 | Yes |
| 8. | To cure stomach-ache | 4.47 | Yes |
| 9. | To cure jaundice | 4.47 | Yes |
| 10. | To cure toothache | 2.98 | Yes |
| 11. | To cure skin diseases | 2.98 | Yes |
| 12. | Wound healing | 2.98 | Yes |
| 13. | To cure diabetes | 2.98 | Yes |
| 14. | To cure acidity | 2.98 | Yes |

| | | | |
|-----|-----------------------------|------|-----|
| 15. | To cure cough | 1.49 | Yes |
| 16. | To cure dysentery | 1.49 | Yes |
| 17. | To cure diarrhoea | 1.49 | Yes |
| 18. | To cure burning scar | 1.49 | Yes |
| 20. | Use as general utilizer | 1.49 | Yes |
| 21. | To cure scorpion bite | 1.49 | Yes |
| 22. | Increase eyesight | 1.49 | Yes |
| 23. | To cure Nausea | 1.49 | Yes |
| 24. | To cure Earache | 1.49 | Yes |
| 25. | Use as digestive agent | 1.49 | Yes |
| 26. | To cure tumour (animals) | 1.49 | Yes |
| 27. | Ulcer | 0 | No |
| 28. | Tuberculosis | 0 | No |
| 29. | Leprosy | 0 | No |
| 30. | Removal of intestinal worms | 0 | No |
| 31. | Religious value | 0 | No |

Table 1b: Showing the % PCTK score strength in *Calotropis gigantea*.

| Sr. No. | Ethnomedicinal uses | PCTK % C.G. | Traditional knowledge existed |
|---------|--------------------------|-------------|-------------------------------|
| 1. | Religious value | 70.14 | Yes |
| 2. | Thorn removal | 0 | No |
| 3. | To cure joint pain | 0 | No |
| 4. | To cure boils | 0 | No |
| 5. | To cure asthma | 0 | No |
| 6. | To cure fever | 0 | No |
| 7. | To cure itching | 0 | No |
| 8. | To cure insect biting | 0 | No |
| 9. | To cure stomach-ache | 0 | No |
| 10. | To cure jaundice | 0 | No |
| 11. | To cure toothache | 0 | No |
| 12. | To cure skin diseases | 0 | No |
| 13. | Wound healing | 0 | No |
| 14. | To cure diabetes | 0 | No |
| 15. | To cure acidity | 0 | No |
| 16. | To cure cough | 0 | No |
| 17. | To cure dysentery | 0 | No |
| 18. | To cure diarrhoea | 0 | No |
| 19. | To cure burning scar | 0 | No |
| 20. | Use as general utilizer | 0 | No |
| 21. | To cure scorpion bite | 0 | No |
| 22. | Increase eyesight | 0 | No |
| 23. | To cure Nausea | 0 | No |
| 24. | To cure Earache | 0 | No |
| 25. | Use as digestive agent | 0 | No |
| 26. | To cure tumour (animals) | 0 | No |

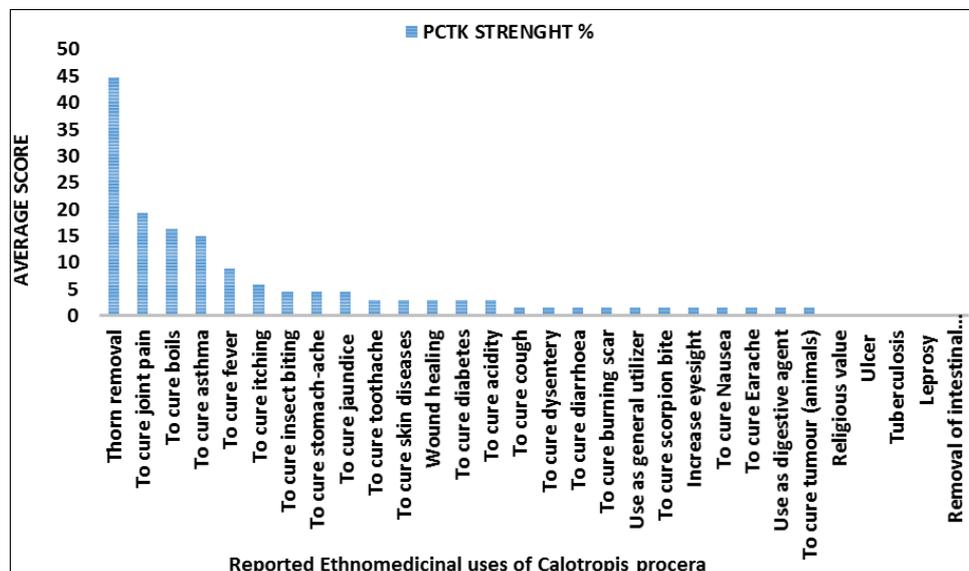


Fig 1: Showing the PCTK strength of *Calotropis procera*.

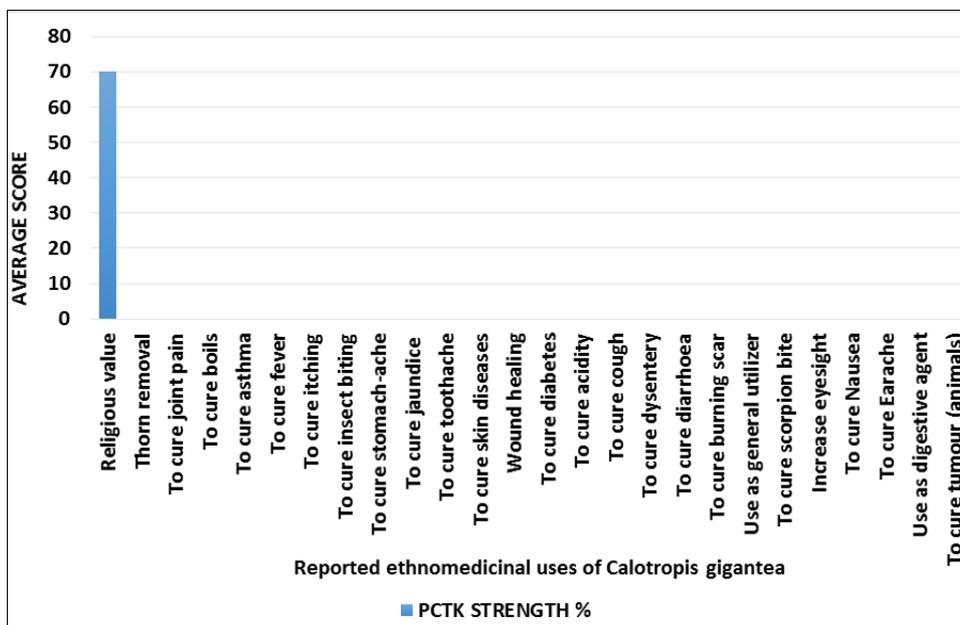


Fig 2: Showing the PCKT strength of *Calotropis gigantea*.

TK is correlated with health care facilities available in the villages. It is general assumption that TK is practised efficiently if health care facilities are minimal. Therefore in field survey health care options are accessed. The order of health care facilities in four villages has been compiled in table no. 2.

Table No. 2 showing the general healthcare profile and literacy rate of four select villages of Jaipur districts in which village 4 i.e. Banethi showing high literacy rate according to data but there are health facilities is not fully satisfied. Like other villages i.e. Bakhrana and Chimanpura also not a good health facility present. Among four surveyed village only one village (Kharab) has satisfactory health facility.

Literacy rate: - Banethi>Bakhrana>Kharab>Chimanpura
In graph 1 shows the sex ratio of informants.

Male: - village 4> village 3> village 1> village 2

Female: - village 2> village 1> village 3> village 4

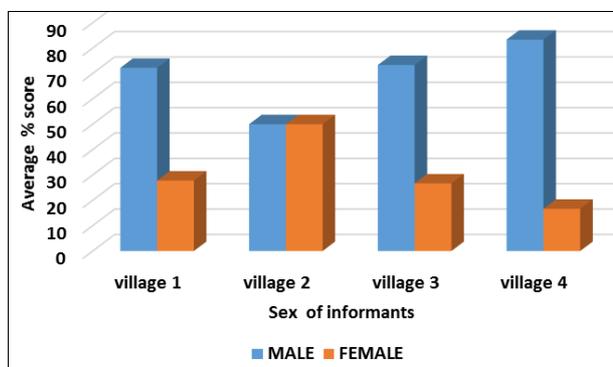
Ethnomedicinal TK is variable according to male and female ratio. Overall three villages have variable value except village 2. There is uniform TK in male and female.

Graph 2 shows the qualification of informants in which all 4 villages showing variability. Overall illiterate and above matric informants are more aware about ethnomedicinal TK about *Calotropis* plant as compared to below matric.

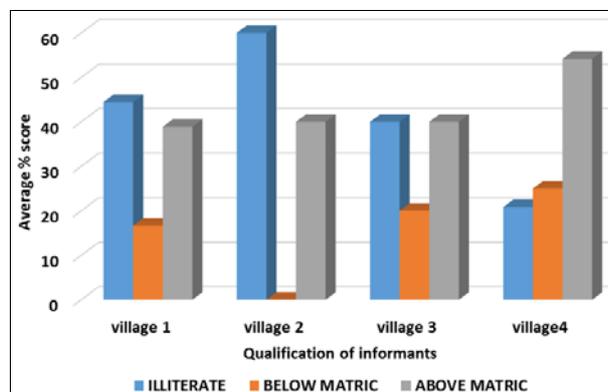
Graph 3 shows ethnomedicinal value varies according to age group in village 1 and 3. There is richest TK appear in above 50 age group informants, on the other hand in village 2 and 4 there is opposite result i.e. 20-50 age group informants are more aware about ethnomedicinal TK.

Table 2: Showing the general healthcare profile and literacy rate of four select villages of Jaipur

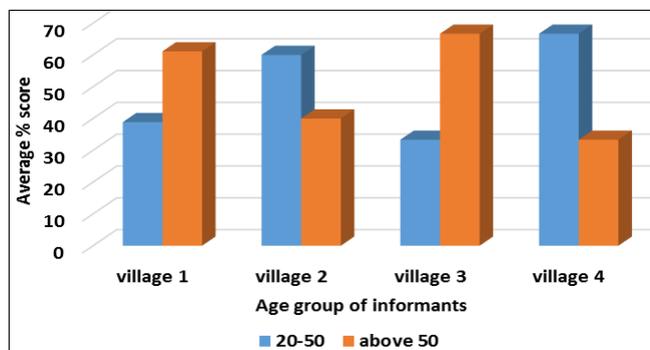
| S. No. | Name of the village | Name of the village Sarpanch | Total literacy rate % | Health facilities |
|-----------|---------------------|------------------------------|-----------------------|-------------------|
| Village 1 | Chimanpura | Puskar Malrawat | 67.73 | Not satisfactory |
| Village 2 | Bakhrana | Arun Kumar | 71.53 | Not satisfactory |
| Village 3 | Kharab | Gokul Chand | 71.05 | Satisfactory |
| Village 4 | Banethi | Suresh Singh | 73.61 | Not satisfactory |



Graph 1: Showing the sex of informants in Jaipur district of Rajasthan.



Graph 2: Showing the qualification of informants in Jaipur district of Rajasthan.



Graph 3: Showing the age group of informants in Jaipur district of Rajasthan.

3. Result

Calotropis procera was more familiar and traditionally used plant in the selected studied sites. After statistical analysis of collected ethnomedicinal data it is concluded that the high percentage of PCTK was recorded in *Calotropis procera* as compared to *Calotropis gigantea*. *Calotropis procera* shows higher PCTK for thorn removal (44.77) while least value for Diarrhea, dysentery, burning scars, tumor etc. *Calotropis gigantea* only known for religious value with 70.14 % PCTK. It is clear evident from table no. 1a and 1b that people are more aware with therapeutic uses of *Calotropis procera* than *Calotropis gigantea*.

On the basis of sex male carried with more T.K. than female in village 1, 3, 4 while in case of village 2 both male n female has slightly equal T.K. furthermore it may be due to less participation of females in 1, 3 and 4 villages.

Illiterate people in the village 1, 2 and 3 are relevant to talk about ethnomedicinal usage of the plant under survey. Illiterate people carried more ethno medicinal knowledge regarding usage of plants.

As the result replicate with the data collected from the village 4 indicating thereby that illiterate people are chain breakers in percolation and transmission of traditional knowledge. On the other hand, above matric literate villagers are most potent resources manpower in conservation and practice of traditional knowledge. They inherited and shared the knowledge with other people. In overall survey it was highlighted that traditional knowledge is under immense threat of denudation and target groups need to be surveyed, monitored and made aware of traditional knowledge conservation strategies for retaining our natural plants resources wealth.

Male were more traditional practioners than female. As per collected data analysis it was found that village 1, 3 & 4 male were dominant informants than female except village 2 where both male n female gave information at equal traditional knowledge.

4. Data analysis

The documented data was analyzed by comparing a PCTK score strength between *Calotropis procera* and *Calotropis gigantea*, sex of informants, qualification of informants and age group of informants. Collected data were analyzed by statistical collection or graphs in Microsoft excel.

5. Conclusion

Physical visibility of the plant was evaluated and villagers are made aware about number of documented uses already in practice and significance of plant highlighted.

Villagers were advised to practice conservation strategies relating to *Calotropis* plant.

Illiterate folks are not playing much important role in conservation of TK. On the other hand, above matric qualified informants are better conservatives of TK.

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