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Prospecting *Curcuma longa* as a Vital Ingredient of Ethno-Veterinary Polyherbal Formulations in Bovine Health-Care Management

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KUMARARAJA GANESAN, PALANICHAMY AYYAPPAN, RAMARAJ JAYAKUMARARAJ*

Post Graduate Department of Botany, Government Arts College, Melur – 625106, Madurai Dist., India

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ABSTRACT

Ethno-Veterinary Medicine (EVM) from different regions of India has been well documented. However, economic aspects and lack of accessibility to modern veterinary infrastructure have been the driving force amongst local farmers to opt for local indigenous knowledge to look after and maintain their livestock. The interest in medicinal plants has re-gained prominence all over the world due to safe and effective bio-active natural principles (BANPs). Present study is an attempt to document the usage of *Curcuma longa* (Turmeric/ Haldi/ Manjal) in Bovine Health-Care Management.

INTRODUCTION

Southern districts of TamilNadu are well known for livestock (LS) based economy. Bovine health-care management is a major challenge considering the volume of LS population and economic status of LS holders in a country like India. Allopathic system of medicine has its limitations in terms of affordability, cost, side effects, emergence of drug resistance, and toxicity towards non-target species. Furthermore, lack of proper treatment leads to substantial loss in LS population and makes management of LS a daunting task. Hence, there is a need to revert to traditional plant-based cost-effective medicine for management of LS health. Nowadays, traditional natural remedies are encouraged in veterinary medicine due to their therapeutic efficacy and minimal side effects (1). Besides, WHO also recommends the sustainable utilization of plant-based medicine. There is an increasing substantiation to explain synergistic and/ or side-effects counteracting combinations of local herbs (2). WHO has estimated that up to 80% of the world's population in the developing world rely on herbal medicinal as a primary source for health-care. Furthermore, the reliance on traditional medical practice(s) involving the use of local herbs is viewed as an integral part of their culture and tradition (3-5). Ironically, herbal medicine as an alternative remedy has re-emerged and is likely to play a more significant role in the management of human and bovine health-care management. However, there is a lack of detailed information about EVM application in cattle disease management from the state of TamilNadu. Hence, present work is perhaps the first detailed record on the application of *Curcuma longa* in EVM and documentation of ethnoveterinary practices in the management of cattle popular among rural public from Madurai district of TamilNadu. Present study is an attempt to document the usage of *Curcuma longa* (Turmeric/ Haldi/ Manjal) in Bovine Health-Care Management.

The genus *Curcuma* L. (Zingiberaceae) represents a group of perennial rhizomatous herbs native to tropical and subtropical regions. *Curcuma* is extensively cultivated in tropical and subtropical regions of Asia, Australia, and South America (6). Out of the 100 or so species reported in the genus *Curcuma*, about 40 are of Indian origin (7). *Curcuma* is endowed with widespread adaptation from sea level to altitude as high as 2000 m in the Western Ghats and Himalayas. *Curcuma* species exhibit significant inter- and intra-specific variation in bio-active principles (Curcumin, Oleoresin and Essential oil) coupled with morphological variations in vegetative and floral characters (8).

Traditional Indian Ayurvedic System of Medicine and Chinese System of Medicine long ago has recognized medicinal property of turmeric in its crude form. Last decade has witnessed extensive research interests in biological activity and pharmacological actions. Recently, *Curcuma* has gained prominence all over the world as a potential source of new drug(s) endowed with anti-inflammatory, hypocholesterolemic, choleratic, antimicrobial, insect repellent, antirheumatic, antifibrotic, anti venomous, antiviral, antidiabetic, antihepatotoxic and anticancerous properties (9).

METHODOLOGY

Study Area:

Madurai district lies between 9°39' - 10°30' N latitude and 77°00'E - 78°30'E longitude. The district is spread over an area of 6500 sq. km and is bound on the North and North-East by Pudukkottai district, on the South by Virudhunagar district, on the South-West by Theni district, on the West by Dindigul district and on the East by Sivagangai district. Maximum and minimum temperature in the district varies between 18 °C - 40 °C. The district receives Mean Annual Rainfall (MAR) of about 600 - 850 mm.

Veerapandi, a small village located in Madurai North Taluk of Madurai district, Tamil Nadu has a total of 500 families. The village has a population of 1907 10) with Average Sex Ratio of 966. The Average Literacy Rate of the village is 77.94 %. Most of the people in the village belong to Konnar Community and rearing of LS is their ancestral profession. Most of the people in this village have their own domestic LS in large numbers.

Ethno-veterinary information was gathered from all categories of village people by contacting healer, herdsmen, headman, elderly persons and person having a thorough knowledge of veterinary practices according to the methodology suggested by Eswaran *et al.*, (11). Some of the commonly occurring veterinary diseases were listed and the existence of these diseases was cross-checked and confirmed with the officials of the local veterinary department.

A total of 10 Herdsmen and 200 Konar Community People (KCP) were interviewed. The questionnaire items included respondent's age, education, and knowledge about the medicinal plants used for treatment. EVET data on the medicinal plants, used by healers and households, vernacular name in Tamil, were recorded. All the specimens were botanically

identified and authenticated with the help of Flora of Tamil Nadu Carnatic (12) and An Excursion Flora of Central Tamil Nadu (13). Voucher specimens were collected and maintained in the Herbarium at Department of Botany, Government Arts College, Melur, Madurai, TamilNadu, India.

RESULTS

During the study, EVM for the treatment of more than 50 veterinary health hazards was documented. A total of 246 plant species belonging to 120 genera and 16 families are used by rural peoples in the treatment of anthrax, bloat, bronchitis, black quarter, corneal opacity, dog bite, enteritis, HF&BF, FMD, GIA, RED, UTI, etc. KCP uses plants, sometimes animal products like cow ghee, bird's feathers, cattle bones, hen flesh, cattle urine, cow's milk, etc. and few minerals like salt, copper sulphate, sodium chloride, ash and calcium carbonate, etc.

The plants are applied in the form of extract, paste, infusion, smoke, etc. These plants are used individually or in the combo (polyherbal preparations). The prepared medicine is given orally, applied to eyes, nose, and ears. Interestingly, a few of the plant species were more commonly used by KCP like *Abrus precatorius, Acalypha indica, Achyranthes aspera, Acorus calamus, Aegle marmelos, Allium cepa, Allium sativum, Aloe vera, Andrographis paniculata, Aristolochia indica, Asparagus racemosus, Azadirachta indica, Calotropis gigantea, Cardiospermum halicacabum, Cassia fistula, Cissus quadrangularis, Curcuma longa, Cynodon dactylon, Datura metel, Dodonaea viscosa, Eclipta prostrata, Euphorbia hirta, Ficus benghalensis, Ficus religiosa, Gossypium hirsutum, Gymnema sylvestre, Justicia adhatoda, Lannea coromandelica, Leucas aspera, Mangifera indica, Melia azedarach, Mimosa pudica, Musa paradisiaca, Ocimum tenuiflorum, Oryza sativa, Piper betle, Psidium guajava, Ricinus communis, Saccharum officinarum, Sesbania grandiflora, Sida acuta, Solanum trilobatum, Syzygium cumini, Tamarindus indica, Tinospora cordifolia, Tridax procumbens, Vigna mungo, Vigna unguiculata, Vitex negundo* and *Zingiber officinale*. Of these medicinal plants, *Curcuma longa* was invariably more frequently used by the KCP. Therefore, this plant was selected for further investigation.

Systematics of *Curcuma longa*

Botanical name	:	*Curcuma longa* L.
Vernacular name	:	Manjal, Haldi
Class	:	Equisetopsida
Subclass	:	Magnoliidae
Superorder	:	Lilianae
Order	:	Zingiberales
Family	:	Zingiberaceae
Genus	:	*Curcuma*
Species	:	*Longa*
Habit	:	Herb
Flowering/ Fruiting	:	Jan –Dec

Ethnobotanical perspectives of *Curcuma longa*

Parts used	:	Rhizome
Familiarity (Years)	:	50 years
Avail Local Market	:	Yes
Availability Status	:	Increase
Wild /Cultivar	:	Cultivar
Combo	:	Mixed
Voucher Number	:	GACMPGBH_10089

EVM Disease(s) used for (10):

Black Quarter (BQ); Skin Disease (SD); Internal Injury (II); Horn Fracture (HF); Bone Fracture (BF); Cattle Wart Disease (CWD); Ectoparasites (EcP); Mastitis; Foot and Mouth Disease (FMD); Stomach-ache

Causative Agents/ Pathogen of the diseases:

BQ - *Clostridium chauvoei*; SD – SMF (CPV); II – Non- Pathogenic (NP); HF – NP; BF – NP; CW – NP; Ectoparasites – Mites, Lice, Flies, Ticks; Mastitis – E. coli; FMD – FMDV; Stomach-ache – GITMF

Symptoms of the diseases:

BQ – Lameness, depression, loss of appetite, hot painful swelling (blackleg), skin over the swelling become cold, dry and leathery; SD – characterized by fever, enlarged superficial lymph nodes and multiple nodules, raised lumps/ bumps that are red or white, a rash, which might be painful or itchy, scaly or rough skin, peeling skin, ulcers, open sores or lesions, dry, cracked skin, discoloured patches of skin; II – bloody discharge from nose/ anus, without any previous signs of illness, sudden onset, high fever, difficult breathing, staggering gait, extreme weakness and sudden death; HF – restlessness, shaking of head, bruxism, reduced feed intake, foul smelling purulent or serosanguinous discharges from fractured site or nostrils, ear twitching; BF – Edema and hematoma of soft tissues caused by ruptured bone marrow evokes pain/ swelling; CW – bleeding, gangrenous or swollen, when infected, PUS; Ectoparasites – hair loss (lice), scabs (mites), lumps on back (grubs), or blood loss (flies, sucking lice and ticks) and weight loss; Mastitis – inflammation of udder and teats; FMD – fever, blisters in mouth and on feet, drop in milk production, weight loss, loss of appetite, quivering lips and frothing of mouth, cows may develop blisters on teats, lameness; Stomach-ache – acute drop in milk production, decreased feed intake, straining to defecate, abdominal distention, increased heart rate, increased respiratory rate, teeth grinding.

Ethnoveterinary Mode:

BQ – *C. longa* (rhizome) is mixed with coconut oil to form a fine paste and applied externally until cured; SD – Paste made out of rhizome of *C. longa* leaves of Acalypha indica with small amount of salt is applied to treat skin infection; II – Paste made out of rhizome of *C. longa* with bulbs of A. cepa and Allium sativum is given orally; HF – Paste made out of rhizome of *C. longa* Leaves of Boerhavia and Azadirachta indica, seeds of R. communis, calcium carbonate powder and naattu sakkarai are mixed and the paste is tied around impaired horn; BF – Paste made out of rhizome of *C. longa*, tender stem of C. quadrangularis with latex of Euphorbia tirucalli, Ficus benghalensis is applied on site, tied with a clean white cloth; CW – Paste made out of rhizome of *C. longa*, leaves of Acalypha

indica with small amount of salt is applied on the cut/ wound; Ectoparasites – Powder/ paste made out of rhizome of *C. longa* is applied on the skin (affected area); Mastitis – Paste made out of rhizome of *C. longa* leaves of Aza. indica and applied over udder; FMD – dry powder of *C. longa* is sprinkle sprayed on the infected site; Alternatively, paste made out of rhizome of *C. longa* , seeds of R. communis, fruits of M. paradisiaca is given orally; Stomach-ache – Rhizome powder of *C. longa* and seed powder of Piper nigrum is mixed with paste made from bulb from the of Allium sativum, boiled in water, cooled to room temperature and the decoction is given orally.

Ethnoveterinary Dose:

BQ – Paste is applied Twice in a day (M – E) for 7 days; SD – Paste is applied Twice in a day (M – E) for 7 days; II – Paste made to balls, Twice a day (M – N) for 7 days; HF – Paste is applied/ tied over horn and left for 7 days; BF – Paste applied once in (3 days interval) for 15 days; CW – Paste is applied Twice a day (M – N) for 7 days; Ectoparasites – Paste is applied as similar to an ointment on skin surface twice a day (M – N) for 7 days; Mastitis – Paste applied twice a day (M – N) for 3 days; FMD – 250 ml, thrice in a day (M – N – N) for 7 days; Stomach-ache – 500 ml, twice a day (M – N) for 2 days.

Figure No. 1: Ethnoveterinary medicinal plants, part(s) used and symptom(s) in cattle:

Curcuma longa L. Plant, Rhizome, Powder, Mastitis infected cattle, Ectoparasites on foot.

DISCUSSION

Medicines derived from plants have played a pivotal role in health-care management both during ancient and modern times (14). Since antiquity Turmeric has been used to treat various ailments in human and domestic animals (15). Haldi is ground with neem leaf is applied in case of scabies in cattle and to heal cuts and wounds in cattle, dogs and other

animals. Turmeric ointment prepared in ghee and white petroleum jelly is used in the treatment of abscesses and wounds of cattle (16). Similarly, juice of fresh rhizome of turmeric is applied to recent wounds, bruises and leech bites in domestic animals. A paste of turmeric and neem leaf is used in ringworm infection, itching, eczema and other parasitic diseases of cattle. A boiled mixture of turmeric (640 g), clarified butter (500 g), milk (1.5 L) and sugar (120 g) mixed with black pepper, ginger and cinnamon is administered at a dose of 10 ml in the morning in the case of prurigo, boils, urticaria and chronic skin eruptions of domestic animals (17). Validation of folk medicinal value of turmeric in treating skin diseases of camel and buffalo and mastitis in cattle has been reported (). Use of common turmeric (*Curcuma longa*) in the control of endoparasites, external and internal injuries, and pregnancy-related problems of ruminants have been documented in Trinidad and Tobago (18). Effective mastitis treatment in cows using gel (Mastelep AV/AMP/4) containing turmeric is reported from India by Buragohain and Dutta (19). The anti-inflammatory activity of the extracts of *C. aromatica* in cattle is also reported. However, systematic pharmaco-vigilance is warranted to augment consistent pharmaco-toxicological information on the safety for the development of plant-based drugs for safe effective use in the days to come. An in-depth understating of chemical composition and biological activities (20) of curcuma species is expected to provide new leads for the development of novel drugs.

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