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Fever of unknown origin (FUO) in cattle and its management using *Febonorm*: An ethnoveterinary medicine

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Abstract

Fever or Pyrexia of unknown origin (FUO or PUO) is generally referred to as any persistent or recurrent fever for which the etiology is not clear in the initial diagnostic testing. However, a variety of causes are documented to be possible viz., infectious diseases, immune-mediated, and neoplastic disease. The present study was carried out in 32 cows and 08 buffaloes that were presented with the history and signs of high fever ($>103^{\circ}\text{F}$) and associated manifestations. All these cattle were found negative for any hemoprotozoa. Treatment was initiated with an ethnoveterinary product from M/s Yourfarm, febonorm @ 15-20 g mixed in 100 g of jaggery 2-3 times a day for 5 days depending upon the severity of fever. Following febonorm administration, reduction of fever along with improvement in appetite and rumen metabolism and improvement in milk yield was noticed in 28 cattle by day 3. However, after day 4 of administration of febonorm all 40 cattle were clinically normal with a mean rectal temperature of $99.6 \pm 0.32^{\circ}\text{F}$ and rumen motility ($3.22 \pm 1.48/2$ min) along with near normal milk yield. No untoward signs were recorded during and after treatment with febonorm.

Keywords: Fever of unknown origin (FUO), Pyrexia of unknown origin (PUO), Ethnoveterinary medicine

Introduction

Livestock production plays a central role in the rural economies of developing countries, particularly within rural communities. It contributes significantly to food security and poverty alleviation while also supporting various cultural and social traditions. Livestock provide multiple benefits, including food, income, and nutrient-rich manure that helps restore soil fertility. Despite these advantages, livestock are highly susceptible to a wide range of diseases that can affect different animal species to varying extents (Kumar and Srikanth 2023) [6]. One among those diseases is Fever/Pyrexia of Unknown Origin caused by non-specific etiology that require immediate medical attention to prevent mortality. Ethnoveterinary medicine refers to the use of traditional knowledge systems, cultural beliefs, practical experience, medicinal plants, and locally developed techniques for maintaining animal health and treating livestock diseases. Ethnoveterinary medicine is one of the major alternative medical approaches to conventional veterinary healthcare for rural farmers and pastoralists (Prayaga and Geddada, 2012).

Materials and Methods

A total of 53 cattle of various breed and gender that were suffering with high recurrent fever were considered for the study. All these cattle were farmer-owned and from private dairy farms. Following a detailed clinical examination and physical examination, blood was collected from peripheral vein for microscopic examination to diagnose the presence of specific etiology. Those cattle that were found negative for any specific etiology were included for therapeutic evaluation. Febonorm, an ethnoveterinary product from M/s Yourfarm was administered orally @ 15-20 g mixed in 100 g of jaggery 2-3 times a day for 5 days depending upon the severity of fever. All these animals were observed for improvement in clinical

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condition and untoward signs.

Results and Discussion

Almost all the cattle that were initially suspected for FVO were presented with the history of anorexia, suspended rumination, generalised weakness, drop in milk yield etc., for a few days. Detailed clinical examination revealed fever (104 ± 1.08 °F), congested conjunctival mucosa, lacrimation, dehydration, sunken eyeballs with mild swelling of peripheral lymph nodes. Few of these cattle were also had a history of tick infestation. Microscopic examination of wet film/stained blood smear prepared from peripheral vein revealed positive for *Trypanosoma* sps in 5 and *Theileria* sps in 8 cattle. Whereas, 40/53 cattle (32 cows and 08 buffaloes) were found negative for presence of any hemoprotozoa, hence considered as suffering with Fever of Unknown Origin. All these 40 cattle were administered orally with febonorm (Ethnoveterinary product from M/s Yourfarm) @ 15-20 g mixed in 100 g of jaggery 2-3 times a day for 5 days depending upon the severity of fever. Following initiation of medication with EVM, alleviation of signs were seen from day 2-3. Reduction of fever along with improvement in appetite and rumen metabolism along with improvement in milk yield was noticed in 28 cattle by day 3. However, after day 4, all 40 cattle were clinically normal with mean rectal temperature (99.6 ± 0.32 °F) and rumen motility ($3.22 \pm 1.48/2$ min) along with near normal milk yield. No untoward signs were recorded during and after treatment with febonorm.

Fever/Pyrexia of Unknown Origin (PUO) in cattle refers to a persistent, often recurrent fever (usually >103 °F) lasting more than 3–5 days, where initial examinations fail to reveal the specific etiology. However, some of the common causes include bacterial (Brucellosis, abscesses), viral (BVD, Ephemeral fever), or parasitic infections (Theileriosis, Babesiosis), demanding a staged diagnostic approach (Parakriti *et al.*, 2023)^[7]. Ethnoveterinary medicine (EVM) is a traditional system of animal healthcare that encompasses indigenous knowledge, cultural beliefs, and practices used to maintain animal health and treat diseases. The associated skills and knowledge are typically passed down orally from one generation to another. Although this valuable cultural heritage is gradually declining in many developed regions, EVM continues to play an essential role in supporting sustainable livestock production in remote and underdeveloped areas of the world. Indigenous herbal remedies derived from plants are widely used to treat livestock diseases. Around the world, millions of indigenous and rural communities rely on locally available plants for multiple purposes, including animal feed and the treatment of diseases. Of the approximately 391,000 known plant species, about 1% have historically been used as food sources, while nearly 10–15% are utilized in traditional medicine. Research on medicinal plants is important for developing new pharmacological products that can improve both human and animal health, particularly because these plants are closely connected to the ecosystems in which they grow. Herbal medicine remains a fundamental component of traditional healing systems among indigenous populations worldwide. Since livestock production is central to rural livelihoods, plant-based ethnoveterinary medicine continues to be extensively practiced across many regions of the world (Prayaga and Gaddada, 2012; Inayat *et al* 2023)^[8 & 4]. Ethnoveterinary preparations have been widely used in the management of East coast fever (John *et al.*, 2003)^[5] and Lumpy skin disease (Kumar and Srikanth, 2023)^[6].

The ethnoveterinary herbal formulation Febonorm is composed of several bioactive ingredients derived from medicinal plants known for their therapeutic potential. Its primary constituents include triterpenes, tannins, and azadiractins from *Azadirachta* species (commonly known as neem), as well as carbohydrates and proteins from *Piper* species, and essential oils from *Coriandrum* species (coriander). Among these, triterpenoids are noteworthy for their diverse pharmacological properties. They have been documented to exhibit antibacterial, antiviral, antitumor, hepatoprotective, and antioxidant activities, as well as to inhibit osteoclastic differentiation (Binita and Deepak, 2022)^[2]. Functionally, triterpenes act as immunomodulatory agents, influencing several key molecular targets, including nuclear factor kappa B (NF-κB), toll-like receptors (TLRs), signal transducer and activator of transcription 3 (STAT₃), and the PI3K/Akt/mTOR signaling pathway (Gill *et al* 2016)^[3]. These pathways are central to regulating inflammation, immune responses, and cell survival. The component derived from *Azadirachta indica* (Neem) further enhances the medicinal value of febonorm. Neem is often referred to as a “tree of life” due to its wide-ranging applications in traditional medicine for both humans and animals. Its principal bioactive compound, azadiractin, has been utilized to treat numerous ailments, including cancer, dental and oral diseases, ulcers, heart disorders, stress, malaria, skin infections, viral diseases including AIDS, and sexually transmitted infections. Neem-based phytochemicals demonstrate a broad spectrum of biological activities such as antidiabetic, antiviral, antioxidant, antimicrobial, antiparasitic, antimalarial, anticancer, antiulcer, hepatoprotective, and gastroprotective effects. Various herbal formulations containing neem extracts are widely employed in the treatment of dermatological conditions like psoriasis, acne, eczema, and infectious viral skin diseases such as chickenpox, warts, and smallpox (Bhowmik *et al.*, 2010)^[1]. The synergistic combination of these plant-derived constituents in febonorm underscores its potential as an effective natural remedy with multidimensional therapeutic benefits for animal health management.

Conclusion

Fever of unknown origin is one of the most common infectious diseases in livestock which is caused by a variety of etiology was evaluated and managed successfully using febonorm, an ethnoveterinary medicine. However, further studies are warranted in a large population and in different geographical areas.

Conflict of Interest

Not available

Financial Support

Not available

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