



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2019; 8(5): 224-227
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www.thepharmajournal.com
Received: 10-03-2019
Accepted: 12-04-2019

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Trypanosomosis in Buffaloes: A retrospective perspective on epidemiology, clinicopathological and therapeutic aspects

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Abstract

This retrospective study attempts at analysis of patterns of prevalence of trypanosomosis, clinical presentation and efficacy of selected drugs among buffaloes of West Godavari district (AP). Epidemiological data relating to season, stocking density, factors favouring vector propagation, individual and herd stress influencing the incidence of disease were considered. Diagnostic specificity and applicability of available tests were evaluated. Age wise prevalence of infestation was studied. Incidence of the infection among the selected clinical cases was recorded and clinical signs are categorized. Clinical efficacy of available trypanosomicidal drugs was recorded. Aspects like containment methods, carrier states, spread and the need for better diagnostic measures were discussed.

Keywords: Trypanosomosis, epidemiological factors, diagnostic specificity, trypanosomicidal drugs, containment

Introduction

Animal trypanosomosis is an important constraint for sustainable productivity and economy of livestock sector with the geographic distribution of the disease is still evolving (Desquesnes *et al.* 2013) [4]. Bovine trypanosomosis is a pertinent disease of economic significance in buffaloes in coastal districts of Andhra Pradesh (Rani *et al.* 2015) [19]. Limited data is available on epidemiological factors, specificity of available diagnostic tests, clinical signs and therapeutic efficacy of drugs among buffaloes in Andhra Pradesh. This study was undertaken with an objective of evaluation of epidemiological, clinical, diagnostic and therapeutic aspects of trypanosomosis in buffaloes in West Godavari (AP).

Materials and methods

11769 blood samples were collected from clinical cases of buffaloes attending to veterinary institutions (2010-2016) showing the symptoms of pyrexia (102-104F), anorexia and production deficit. Clinical symptoms were recorded and categorized. Thick and thin blood smears were microscopically examined by wet smear and by Giemsa staining. Animals were reared under semi intensive system, maintained under local feeding practices and allowed for 6-8 hours of grazing. Suspected chronic clinical cases of trypanosomosis was examined by lymph node aspirates (22), buffy coat method (26), microhaematocrit centrifuge technique (28) as per OIE manual (2008) [12]. Season, rainfall, temperature, humidity and geographic settings were considered. Low plane of nutrition, pregnancy, parturition, lactation, vaccination, stocking density, inadequate housing, poor drainage facility and vector prevalence were considered as stressors. The mean rain fall for the study period was 8.2 cm with the temperatures ranging from 18°C to 47°C with warm and humid climate. Trypanosomicidal drugs viz., Diminazene diacetate, Quinapyramine sulphate & chloride (Prosalt) and Isometamedium were evaluated for their clinical efficacy and regression of parasitemia.

Results and discussions

Epidemiological aspects

Seasonal Incidence patterns were tabulated and agrees with Prasad *et al.* (1997) [16] and Das *et al.* (1998) [3] Krishna and Guntur district respectively while Bhaskar and Hafez (2005) [1] recorded relatively higher incidence in East Godavari district.

Higher incidence correlated with stressors and seasonally increased agricultural and husbandry activities.

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The degree of parasitemia varied with the susceptibility of host, clinical phase of infection and stressors. Season, pasture depletion and malnutrition, low input management practices and vector distribution influence the incidence of disease (Migri *et al.* 2016) [11]. Adequate energy, protein and vitamin-micronutrient nutrition enhances the ability of trypanosome infected animals to withstand the adverse effects of infection (Pathak 2009) [13] while Gupta *et al.* (2003) [6] recorded recrudescence of trypanosomiasis in dexamethasone treated buffalos indicating the influence of stress related cortisol elevation on parasitemia.

Lactating buffaloes are most effected (64.2%) followed by heifers (31.2%) and adult calves (4.6%). Stress of parturition,

lactation precipitated the disease and reporting of clinical cases was prompt when sudden drop in milk production was observed. Maternal immunity, low intensity stressors and lesser exposure to vectors appears to limit the incidence of disease among young calves.

Season was a significant predictor for the incidence where environmental transition was from humid to dry hot weather. Monsoons, warm humid weather, increase in cultivating land and water logging favors the spurt in vector population and infection. Incidence of trypanosomiasis in bovines was directly proportional to monsoon, post monsoon (Sinha *et al.* 2006) [20] and improved irrigation of vast tracts of arid land (Pathak and Khanna 1995) [14].

Table 1: Season wise incidence of trypanosomiasis (%)

| 0 | April June | July- Sept | Oct- Dec | Jan Mar | Total |
|---------|----------------|-----------------|-----------------|----------------|------------------|
| 2010-11 | 2/366(0.55) | 15/417(3.6) | 35/657 (5.4) | 12/587 (2.04) | 64/2027 (3.16) |
| 2011-12 | 9/429 (2.1) | 17/677 (2.51) | 31/818 (5.54) | 13/311 (4.18) | 70/2235 (3.13) |
| 2012-13 | 16/294 (5.44) | 44/798 (5.54) | 16/426 (3.75) | 6/406 (1.5) | 82/1920 (4.3) |
| 2014-15 | 5/216 (2.31) | 3/188 (1.6) | 12/570 (2.11) | 8/609 (1.31) | 28/1583 (1.77) |
| 2015-16 | 6/337 (1.78) | 20/638 (3.13) | 29/770 (3.77) | 10/559 (1.79) | 65/2304 (2.82) |
| | 48/2350 (2.04) | 111/3064 (3.65) | 137/3586 (3.82) | 63/2789 (2.26) | 359/11769 (3.05) |

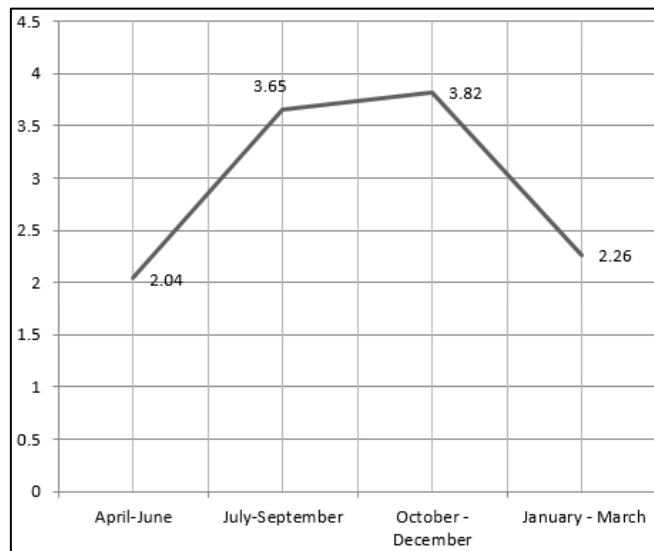


Fig 1: Seasonal incidence of trypanosomiasis in W. Godavari (%)

Clinical evaluation

Clinical signs were in concurrence with Kumar *et al.* (2010) [9] & Rani *et al.* (2015) [19]. High parasitemia was recorded in aborted animals at 3rd trimester and agrees with the observations of Lohr *et al.* (1986) [10]. Increase in clinical

cases after foot and mouth vaccination indicating the resurgence of dormant infestation due to post vaccination stress. Anemia, wasting, lymphadenopathy and jaundice were important predictors for chronic infestations and might provide grounds for a putative diagnosis.

Table 2: Incidence of trypanosomiasis among suspected Clinical Cases

| S. No | Clinical condition | No Screened | No Positive | % Positive |
|-------|-----------------------------|-------------|-------------|------------|
| 1 | Pyrexia& Anaemia | 226 | 29 | 12.9 |
| 2 | Oedema of dependent parts | 36 | 2 | 5.6 |
| 3 | Sudden drop in milk yield | 27 | 4 | 14.8 |
| 4 | Corneal opacity and pyrexia | 19 | 2 | 10.5 |
| 5 | Mastitis and pyrexia | 21 | 2 | 9.5 |
| 6 | Abortions | 9 | 1 | 11 |
| 7 | Nervous symptoms | 19 | 3 | 15.8 |

Diagnosis

Trypanosomes in blood are best demonstrated during acute stage of infestation and peak of pyrexia. Sub terminal kinetoplast, well developed undulating membrane, centrally located nucleus, and free flagellum allows identification as

Trypanosoma evansi (Soulsby 1982) [21]. Number of protozoa appears to be increased in the peripheral circulation after infusion of 5% dextrose saline but results are inconsistent. Majority of infections were cryptic and undetectable by direct microscopy, lower than sero prevalence (Dhami *et al.* 1999)

^[5] and conventional methods were insufficient to know the epidemiology and magnitude of the infection (Jaiswal *et al.* 2015) ^[7]. Protozoa in chronic cases tends to evade direct blood smear examination requiring keen scrutiny and examination of stained lymph node aspirate (Ramakrishna and Yoganand 2008) ^[18] and 22% of lymph node aspirates from suspected chronic cases are positive. Hematocrit Centrifuge Technique or Buffy Coat Method found to be more sensitive and has the additional advantage of monitoring the packed cell volume. These tests increase the sensitivity of the test down to 100-200 trypanosomes per milliliter and are low cost alternatives to direct smear methods with enhanced sensitivity of parasite detection (Jaiswal *et al.* 2015) ^[7].

Treatment & its evaluation

Lack of practical and effective vector control program led to exclusive dependence on trypanosomicidal drugs and were useful during the moments of livestock in endemic areas and in seasonal flare-up of vectors the control of sporadic trypanosomiasis.

In the present study 18, 16 and 6 clinically effected lactating buffaloes with high parasitemia (25-40 protozoa /HPF) were selected and treated using Diminazene diaceturate, (4 mg/kg I/M) Quinapyramine methyl sulphate & chloride (Prosalt 5 mg /Kg s/c) and Isometamedium chloride (0.5mg/kg) respectively as a single dose. Supportive therapy includes Dextrose (20%) 5ml/kg IV, Iron Dextran, B complex, liver extracts and improved feeding practices. Clinical recovery was evaluated on the basis of microscopic examination (4, 8,12,18,24 hrs. post treatment) for parasitemia and for improvement in clinical symptoms.

Regression of parasitemia occurred within 8 hrs. and complete disappearance in 20 hours both for Diminazene and quinapyramine sulphate but 24-26 hours for Isometamedium. Reactions like local swelling at the site of injection, shivering and salivation were recorded with Isometamedium. Normal temperature, restoration of appetite & milk production took 5-7 days with continued supportive therapy. Joshi and Singh (2000) ^[8] found that Prosalt and isometamedium are equally effective. Buffaloes treated with single dose of quinapyramine methyl sulphate-chloride (Raina *et al.* 2000) ^[17] and Chand *et al.* (2008) ^[2] found that two doses at 72 hrs. Were more effective.

The possibility of development of resistance to Quinapyramine sulphate and Diminazene cannot be ruled out as they required two doses 72 hours apart for recovery and noted high proportion of relapse due to various stressors among selected cases. Ponnudurai *et al.* (2015) ^[15] recorded Diminazene resistance among buffaloes. Alternating the drugs in endemic areas is recommended to avert possibility of resistance development and Prosalt when used during August-September provide prophylactic effect at least for 3 months.

Management of anemia is a challenge during post recovery phase where hemoglobin as an anemic index tends to rise slowly despite better nutritional attention and anemic animals tend to be anorexic. Research is warranted on effective management of parasitaemia, anemia and nutritional support that influence the overall recovery and productivity.

Conclusions

Endemic status of trypanosomiasis in Andhra Pradesh can cause seasonal spurt in acute disease, chronic clinical and carrier states among buffaloes. Regular screenings are required for suspected cases attending to veterinary clinics,

rural free range buffaloes and farm animals to know the incidence pattern and varied clinical presentation. Therapeutic aspects require periodic review to evaluate drug efficacy, dosage, toxicity and possibility of development of resistance.

Acknowledgements

The authors are thankful to the director of animal husbandry AP Vijayawada for providing the facilities to carry out this work.

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