Prevalence of bovine microfilariasis in Rayalaseema region of Andhra Pradesh

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Abstract The Prevalence of microfilariasis of bovines was studied in four districts of Rayalaseema region of Andhra Pradesh with respect to species, age, breed, sex and physiological status viz., lactation, season for a period of 1 year. A total of 1286 blood samples were examined by conventional techniques viz. Wet blood film, blood smear examination and Knott's method with an overall prevalence of 2.72% (35/1286) was recorded in bovines. The prevalence observed in buffaloes and cattle was 2.97% (20/672) and 2.45% (15/614) respectively. With respect to region, higher rate of infection was recorded in Kurnool (3.25%) followed by 3.12, 2.5 and 2.01% in Anantpaur, Chittoor and Kadapa districts, respectively. The infection was higher in female animals (2.79%) whereas no positive case could be detected among the 32 male animals screened. Breed wise analysis revealed, highest prevalence was observed in cross bred cattle (3.04%) and graded Murrah (3.67) than non-descriptive cattle (0.64%) and buffalo (1.89%). Significantly higher prevalence was noticed in the age group of above 9 years (4.72%) followed by 6–9 years (2.98%), 3–6 years (2.05%) and below 3 years (1.04%). In lactating animals significantly higher prevalence was observed (3.47%) followed by non-lactating animals (2.65%) and heifers (0.47). Further higher

prevalence was detailed during rainy season (3.89%) in comparison to summer (2.87%) and winter (1.25%) season.

Keywords Microfilariasis · Andhra Pradesh · Bovine · *Setaria cervi*

Introduction

Among various parasitic diseases of livestock, filariasis is an important entity with a worldwide distribution. These filarial worms are mostly prevalent in tropical countries including India (Singh et al. 2013). Among the filarid nematodes the adult *Setaria* spp. which normally found in the peritoneal cavity of buffaloes and cattle, remains undetected of their harmless surveillance. Immature forms of *Setaria* spp. erratically migrate in the central nervous system of abnormal hosts such as sheep, goats and horses (Soulsby 1982). In the definitive host, infective larval stages occur in the blood of the host and are responsible for a disease entity called microfilariasis. Prevalence of microfilariasis is necessary for understanding the microfilariasis transmission in livestock, development of improved diagnostic assay and also for its effective control. Digraskar (1996) reported the incidence of microfilariasis in buffaloes in and around Tirupati, Andhra Pradesh with the prevalence of 3.4%. A comparative study of microfilaria prevalence was also reported between humid region of coastal Andhra Pradesh and part of the Rayalaseema region (Tirupati) of Andhra Pradesh by Pavan Kumar (2004). Since there is paucity of information in the region of Rayalaseema, the present study was carried out to detect microfilariasis in cattle and buffaloes in four districts of Rayalaseema region of Andhra Pradesh.

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Materials and methods

To record the prevalence of microfilariasis a total of 1286 blood samples (672 from buffaloes and 614 from cattle) were collected randomly (prior consent is taken from the owner for collecting blood) in a EDTA coated sterile glass vials from the four districts of Rayalaseema region for the duration of 1 year (Jan 2008 to Dec 2008). The collected blood samples were examined on the same day by wet blood film method, stained blood smear (Giemsa and JSB staining) and modified Knott's method (Vihan 1991) where the later was considered as confirmatory test. Blood samples from ten apparently healthy animals were also collected and analysed as control. Data was collected in a prescribed proforma with the following details like place, date, owner's name, case number, species, age, sex, season, clinical signs, milk production, agro-climatic conditions (Temperature and relative humidity), geographical information with respect to surroundings and vector population.

The statistical analysis of the data was carried out by using the standard methods of Snedecor and Cochran (1994).

Conventional staining method

Giemsa/JSB staining was carried out according to the method described by Vihan (1991), Singh and Bhattacharji (1944) respectively with minor modifications.

J S B staining: (Jaswanth singh and Bhattacharji 1944)

Blood smears were fixed in methyl alcohol, then immersed in solution-I (Methylene blue 0.5 g, Potassium dichromate 0.5 g, 1% v/v Sulphuric acid 3 ml, 1% Potassium hydroxide 10 ml and Distilled water 100 ml) for 30 s and washed in a jar containing acidulated water of pH 6.2–6.6. It was then stained with solution-II (Eosin yellow 1 g in 500 ml Distilled water) for 1 s and washed in the same acidulated water. Again the slide was immersed in solution-I for 30 s and then washed in fresh acidulated water for 10 s or till the smear gave a pink background. The smear was then dried and examined.

Modified Knott's method

One ml of microfilaria suspected blood was mixed with 9 ml of 2% formalin; the content was mixed gently and allowed to stand for 3–5 min. Further, centrifugation was carried out for 5 min at 2000 rpm, a drop of sediment was mixed with equal amount of 1:1000 methylene blue and examined under low power (Vihan 1991).

Results and discussion

A total number of 1286 blood samples (672 Buffaloes and 614 cattle) were examined by Knott's method and blood smear examination (Giemsa's and JSB staining techniques). All the microfilariae detected in 35 clinical cases were long, slender, anterior blunt and tapering posterior ends. Cephalic end was round with a median projecting knob. Obliquely placed Nerve ring then presence of an excretory apparatus consisting of an excretory pore and excretory cell. Posteriorly Germ cells and anal pore were situated. Long Central viscous was clearly visible. Caudal sheath extended beyond the tail. Average length, width of microfilaria was 248 ± 1.61 and 6.08 ± 0.19 , length and width of cephalic space 7.28 ± 0.5 and 5.8 ± 0.12 , caudal sheath space was 22.82 ± 1.63 , length from the anterior point to the excretory pore was 71.12 ± 1.77 , length from anterior extremity to anal pore 190.17 ± 2.28 , length of central viscous was 21.03 ± 2.07 microns.

All the microfilariae detected in 35 clinical cases were identified as *Seteria cervi* based on the morphological features and micrometrical findings. The observations were in accordance with the findings of Williams (1955), Mukherjee (1965), Vinod et al. (1987), Sharma and Kumar (1994), Digraskar (1996), Pavan kumar and Sreedevi (2004), Sharma and Joshi (2002), Singh (2003) and Bino sundar (2010).

Overall prevalence

The overall prevalence of microfilariasis in bovines in Rayalaseema region of Andhra Pradesh was 2.72% from 35 animals among 1286 were examined (Table 1), which is higher than Pavan kumar and Sreedevi (2004) who recorded an incidence of 1.92% and lower than Digraskar (1996) of 3.4% prevalence in Tirupati (Rayalaseema region). The difference could be due to the attention given by the workers particularly to animals showing similar symptoms of microfilariasis and also longer duration of study.

District wise prevalence

In the present study the prevalence of 2.5, 2.012, 3.125 and 3.26% was observed in Chittoor, Kadapa, Anantapur and Kurnool districts, respectively (Table 1). The higher prevalence was noted in Kurnool followed by Anantapur, Chittoor and Kadapa districts. The difference in the prevalence may be due to various climatic conditions i.e. humidity (70%) is more in Kurnool followed by (50, 44 and 40%) in Anantapur, Chittoor and Kadapa districts respectively which is essential factor for the rapid propagation of intermediate host i.e. mosquitoes. Sastry and

Table 1 Prevalence of microfilariasis in bovines in Rayalaseema region of Andhra Pradesh

Sl. no	Place of survey	No. of animals examined (buffaloes)	No. of animals found positive (buffaloes)	Percent of infection (Buffaloes)	No. of animals examined (cattle)	No. of animals found positive (cattle)	Percent of infection (cattle)	Total no. of animals examined	Total no. of animals found positive	Percent of infection (%)
1	Chittoor	182	5	2.74	178	4	2.24	360	9	2.5
2	Kadapa	152	4	2.63	146	2	1.36	298	6	2.012
3	Anantapur	190	6	3.15	162	5	3.08	352	11	3.125
4	Kurnool	148	5	3.37	128	4	3.12	276	9	3.260
	Total	672	20	2.97	614	15	2.45	1286	35	2.72

Significant $P < 0.01$ (between buffaloes and cattle)

Pradyumna Rao (1985), Prasad et al. (1997) and Venu et al. (2000) recorded an overall incidence of 5.25, 1.34 and 7.46% in West Godavari District of Andhra Pradesh. The higher incidence might be due to the swampiness of these areas with a yearlong humid climate (75–85%).

Species wise prevalence

Overall prevalence of microfilariasis in buffaloes and cattle in Rayalaseema region of Andhra Pradesh was 2.97, 2.45% respectively. Considerably higher prevalence of microfilariasis in buffaloes may be due to their wallowing preference to thrive well in swampy areas which provides a congenial environment for vector population. Higher incidence of bubaline microfilariasis has also been reported in hyper endemic areas of Tarai region Kumaon hills, Uttar Pradesh (India) by several authors (viz. Singh et al. 1973; Kumar 1980; Sharma et al. 1985; Vinod et al. 1987; Sharma and Kumar 1994; Siddiqui et al. 1996).

Age-wise prevalence

The age wise prevalence was recorded in four categories viz., below 3 years, 3–6, 6–9, above 9 years with 1.04, 2.05, 2.98 and 4.72% positivity for microfilariasis (Table 2).

The highest prevalence observed in above 9 years age group might be due to frequent and prolonged exposure to the vectors as reported by Sharma and Kumar (1994) and Kumar et al. (1993). Sharma and Kumar (1994) recorded highest incidence in animals aged above 12 years (40.38%). Pavan kumar and Sreedevi (2004) revealed highest incidence rate (9.54%) in the age group of above 9 years and the lower incidence (0.88%) in below 3 years.

Sex-wise prevalence

Out of 32 male animals examined for microfilariasis at four districts of Rayalaseema region (Chittoor, Kadapa,

Anantapur and Kurnool) none of the animal was detected positive for microfilariasis. Thirty-five were found positive in females with an incidence rate of 2.79% (Table 3). This result corroborated with the findings of Pavan kumar and Sreedevi (2004) who recorded 4.32% prevalence in female bovine while no incidence among males. In contrary Singh (1973), Kumar (1980) reported higher incidence in male Buffaloes in and around Tarai region of Kumaon hills of Uttarakhand India. However no conclusion could be drawn on sex wise prevalence due to small and unequal sample size of male animals when compare to female animals.

Breed wise prevalence

Among the cattle population, cross bred cattle showed a significantly higher rate of infection (3.04%) than non-descriptive animals (0.64%) (Table 4) and similar data was observed in Murrah buffaloes (3.67%) and non-descriptive animals (1.89%) (Table 5). The higher incidence of microfilariae might be due to the fact that the graded Murrah buffaloes are higher yielders or under constant physiological stress. Further, Jet black skin and less hair appearance of Murrah buffaloes than non-descriptive buffaloes might be attracting more mosquitoes (Kumar et al. 1993). The result is in confirmation with the findings of Pavan kumar and Sreedevi (2004) who recorded 3.57 and 5.21% in cross bred cattle and graded Murrah buffaloes when compared to non-descriptive animals (2.95%). Analogous findings of 5.68 and 2.52% of microfilariasis incidence were reported in graded Murrah buffaloes and non-descriptive buffaloes (Digraskar 1996).

Prevalence based on lactation status

The prevalence of microfilariae in heifers, lactating and non-lactating animals was 0.47, 3.47 and 2.65% respectively (Table 6). The incidence was significantly higher in lactating animals followed by non-lactating animals and heifers. The results correspond to the observations made by

Table 2 Age-wise prevalence of microfilariosis in bovines in Rayalaseema region of Andhra Pradesh

Sl. no	Place of survey	No. of animals examined	No. found positive (%)	Below 3 years (1)		3–6 years		6–9 years		Above 9 years	
				No. examined	No. found positive	No. examined	No. found positive (%)	No. examined	No. found positive	No. examined	No. found positive
1	Chittor	360	9 (2.5)	58	1 (1.72)	61	2 (3.27)	210	6 (2.85)	31	–
2	Kadapa	298	6 (2.013)	12	0	110	1 (0.90)	139	3 (2.15)	37	2 (5.40)
3	Anantapur	352	11 (3.125)	14	0	138	3 (2.17)	140	5 (3.57)	60	3 (5.0)
4	Kurnool	276	9 (3.260)	12	0	129	3 (2.32)	115	4 (3.47)	20	2 (10.0)
	Total	1286	35 (2.72)	96	1 (1.04)	438	9 (2.05)	604	18 (2.98)	148	7 (4.72)

Significant $P < 0.01$ [Between (1) and (2)]Significant $P < 0.04$ [Between (1) and (3)]**Table 3** Sex-wise prevalence of microfilariosis in bovines in Rayalaseema region of Andhra Pradesh

Sl. no.	Place of survey	No. of animals examined	No. found positive (%)	Female		Male	
				No. examined	No. found positive	No. examined	No. found positive
1	Chittor	360	9 (2.5)	342	9 (2.63)	18	–
2	Kadapa	298	6 (2.012)	292	6 (2.05)	6	–
3	Anantapur	352	11 (3.125)	344	11 (3.19)	8	–
4	Kurnool	276	9 (3.250)	276	9 (3.26)	–	–
	Total	1286	35 (2.72)	1254	35 (2.79)	32	–

Table 4 Breed wise prevalence of microfilariosis in cattle in Rayalaseema region of Andhra Pradesh

Sl. no	Place of survey	No. of animals examined	No. found positive (%)	Cross bred (1)		Indigenous (2)	
				No. examined	No. found positive	No. examined	No. found positive
1	Chittor	178	4 (2.24)	143	4 (2.79)	35	–
2	Kadapa	146	2 (1.36)	114	2 (1.75)	32	–
3	Anantapur	162	5 (3.08)	101	4 (3.96)	61	1 (1.63)
4	Kurnool	128	4 (3.12)	102	4 (3.92)	26	–
	Total	614	15 (2.45)	460	14 (3.04)	154	1 (0.64)

Significant $P < 0.01$ (Between (1) and (2))**Table 5** Breed wise prevalence of microfilariosis in buffaloes in Rayalaseema region of Andhra Pradesh

Sl. no	Place of survey	No. of animals examined	No. found positive (%)	Graded Murrah (1)		Non descriptive (ND) (2)	
				No. examined	No. found positive	No. examined	No. found positive
1	Chittor	182	5 (2.74)	98	3 (3.06)	84	2 (2.38)
2	Kadapa	152	4 (2.63)	109	4 (3.66)	43	–
3	Anantapur	190	6 (3.15)	117	5 (4.27)	73	1 (1.36)
4	Kurnool	148	5 (3.37)	84	3 (3.57)	64	2 (3.12)
	Total	672	20 (2.97)	408	15 (3.67)	264	5 (1.89)

Significant $P < 0.05$ (Between (1) and (2))

Table 6 Prevalence of microfilariosis basing on lactation status in females in Rayalaseema region of Andhra Pradesh

Sl. no	Place of survey	No. of animals examined	No. found positive (%)	Heifers (1)		Lactating (2)		Lactating (2)	
				No. examined	No. found positive	No. examined	No. found positive	No. examined	No. found positive
1	Chittor	342	9 (2.5)	68	1 (1.47)	215	6 (2.79)	59	2 (3.38)
2	Kadapa	292	6 (2.012)	35	–	185	4 (2.16)	72	2 (2.77)
3	Anantapur	344	11 (3.125)	48	–	234	10 (4.27)	62	1 (1.61)
4	Kurnool	276	9 (3.25)	62	–	143	7 (4.89)	71	2 (2.81)
	Total	1254	35 (2.75)	213	1 (0.47)	777	27 (3.47)	264	5 (2.65)

Significant $P < 0.01$ [Between (1) and (2)]Significant $P < 0.01$ [Between (1) and (3)]**Table 7** Season wise prevalence of microfilariosis in bovines in Rayalaseema region of Andhra Pradesh

Sl. no.	Season (07–08)	Total no. of animals examined	Total no. of animals found positive	(%) Percent of infection
1.	Rainy season (July–Oct)	436	17	3.89
2.	Winter season (Nov–Feb)	398	5	1.25
3.	Summer season (March–June)	452	13	2.87
	Total	1286	35	2.68

Kumar (1980); Sharma and Kumar (1994) and Digraskar (1996) also reported highest incidence of 31.57; 32.28 and 3.8% respectively in lactating animals. This can be attributed to the lactation stress and immunosuppression due to prolactin hormone in lactating animals which makes the animal more susceptible to microfilariasis.

Season-wise prevalence

Rainy season was more conducive for microfilariasis with 3.89% followed by summer (2.87%) and winter (1.25%). Ansari (1977) reported highest incidence during rainy season (42.4%) and least during winter (6.61%). Most of the authors recorded highest incidence during monsoon which could be due to the abundance of the vector population in this period (Soulsby 1982). The difference in the incidence with respect to season could be due to the favorable agro climatic conditions for preponderance of intermediate host which are essential for the completion of life cycle of the adult worms in a year (Ansari 1977) (Table 7).

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