

## A STUDY ON PREVALENCE AND ASSOCIATED RISK FACTORS OF *Toxocara vitulorum* IN BUFFALO CALVES IN LAHORE, PAKISTAN

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Present study was designed to evaluate the prevalence of Toxocariasis in buffalo calves in outskirts of Lahore. For this 5g fecal samples from 369 buffalo calves were collected directly from the rectum to avoid the soil contamination. For this purpose, buffalo calves between 1 to 20 weeks of age were selected. Data regarding each calve and possible associated risk factor i.e. species, sex, breed, age, physical condition, weaning time, fecal score, feeding, housing and management etc. was recorded. The fecal samples were analyzed by direct smear method. Positive samples for *Toxocara vitulorum* were further subjected to McMaster Technique for egg per gram (EPG) count. Out of total 369 buffalo calves, 87 (23.58%). buffalo calves were found to excrete *T. vitulorum* eggs in their feces. While 212 (76.42 %) buffalo calves were found normal with no fecal egg excretion. 23 calves (26.44 %) with age of 1-4 weeks, 37 calves (42.53 %) with age of 5-10 weeks and 27 calves (31.03 %) were found positive. Percentage of male and female infected calves were 25.79 % and 21.23 %, respectively. Number of non-infected calves in healthy and sick animals were 236 (80.55 %) and 54 (71.05 %), respectively. While infected calves in healthy and sick animals were 57 (19.45 %) and 22 (28.95 %). Number of sick and healthy mothers of calves were 54 and 315, respectively. 13 calves (24.07%) were infected with *T. vitulorum* infestation whom mother was sick, while 67 calves (21.27%) were infected with *T. vitulorum* whom mother was healthy.

**Keywords:** *Toxocara vitulorum*, Buffalo-Calves, Lahore

*Toxocara* (syn. *Neoascaris*) *vitulorum* is a worldwide member of the Ascaridoidea, a highly prevalent parasite of cattle and buffaloes in tropical and subtropical regions. It is responsible for high morbidity and mortality rates of 15- to 50-day-old calves (Mia et al., 1975). When the infection is not controlled in the field, the prevalence can reach 100% in calves and deaths frequently occur when associated with poor nutrition (Chelladurai et al., 2015). The control of this parasite is not easy because the larvae migrate in the host tissues remaining as dormant or hypobiotic parasites and can survive for a long time (Starke et al., 1996). Moreover, larval trans-mammary passage to calves occurs after birth and is the most important route of the infection. Only a limited number of studies have been published and one reason for this may be that this parasite is more of a problem of bovine and buffalo calves, particularly from poor tropical countries (Dorny et al., 2015). However, the water buffalo is considered among the most productive domestic animals in these countries. The world population of water buffaloes is more than 150 million in some 40 countries, ranging from Australia through Indonesia and the Philippines to Pakistan, Indo-China, India, Burma, Iran, Iraq, Turkey, Russia, Egypt and several European countries (Albania, Bulgaria, Greece, Italy, Romania and Yugoslavia) (Fuquay et al., 2011). In the New World, there are buffaloes in Brazil, Colombia, Ecuador, Venezuela and the USA. Buffalo is also a source of quality meat and milk, which, as a result of its unique conversion capacity, can be produced more cheaply than by cattle and perhaps any other animal. There is an expanding trade in

breeding stock and in frozen semen (Cockrill, 1981).

The opinion is frequently expressed that water buffaloes are resistant to many of the infections of cattle and other species; however, *T. vitulorum* infection is widespread and worm burdens are invariably much heavier in buffalo calves than in cattle calves. This parasite can be a serious impediment to successful buffalo breeding (Murthy and Rao 2014). Control of this infection produces considerable economic benefits. Adult stage *T. vitulorum* can be effectively treated with piperazine, pyrantel, febantel, fenbendazole and Oxfendazole (Shalaby and El-Moghazy 2013). However, in developing countries, the farmers and herdsmen do not have an easy access to the professional veterinary personnel. In addition, despite availability of veterinarians, farmers usually rely on their personal knowledge for prevention and treatment of helminthiasis. This situation has led to the fact that medicinal plants are the only alternative to anthelmintic therapy (Shalaby et al., 2012).

Limited literature is available regarding the occurrence and treatment of *T. vitulorum* in buffalo calves reared by small holders. Therefore, present study is designed to determine the prevalence and associated risk factors of Toxocariasis in buffalo calves in smallholder farms and to evaluate the comparative efficacy of herbal, oral and injectable anthelmintics against Toxocariasis.

## MATERIALS AND METHOD

### *Study population and study design*

The fecal samples from 369 buffalo calves were collected to determine the prevalence of Toxocariasis. The fecal samples were collected from calves between 1 to 20 weeks of age. Data regarding each calve and possible associated risk factor was entered in data capture form. The data capture form included information on species, sex, breed, age, physical condition, weaning time, fecal score, feeding, housing and management etc.

### *1.1. Fecal Sample Collection and Analysis*

About 5 gm of fecal sample was collected directly from the rectum of each buffalo calf.

For freshly voided feces the sample was collected from the center avoiding contamination with soil and dust. After collection the fecal samples were immediately transferred to ice box for transportation to Medicine Laboratory, Department of Clinical Medicine and Surgery, University of Veterinary and Animal Sciences, Lahore. Fecal examination was done by direct smear method. Positive samples for *T. vitulorum* were further subjected to McMaster Technique for Egg per gram (EPG) count as described by (Souls by, 1982). This is a method for determining the number of nematode eggs per gram of feces in order to estimate the worm burden in an animal.

### *1.2. Statistical Analysis*

Data on prevalence was analyzed using chi square test while Odd Ratio (OR) was determined for association of *T. vitulorum* with different risk factors. The data on EPG at various days was analyzed through two-way analysis of variance (ANOVA). Statistical analysis was performed by using SPSS version 20, at a significance level of 5%.

## RESULTS

### *Prevalence*

Out of total 369 buffalo calves, 87 (23.58%), buffalo calves were found to excrete *T. vitulorum* eggs in their feces. While 212 (76.42 %) buffalo calves were found normal with no fecal egg excretion. A significant difference ( $p < 0.05$ ) was observed regarding the occurrence of *T. vitulorum* infection in buffalo calve.

### *Associated Risk Factors*

#### *Age*

Table 3 showed that 23 calves (6.23%) with age 1-4 weeks, 37 calves (10.03%) with age of 5-10 weeks and 27 calves (7.32%) were positive for *Toxocara vitulorum* infestations. No significant difference ( $p > 0.05$ ) was observed between the calves of different age groups with respect to *Toxocara vitulorum* problem.

#### *Gender*

Table 3 showed that 53 buffalo calves were male, while remaining 34 were female. With percentage of male and female infected

Table 3 Associated risk factors of prevalence of *Toxocara vitulorum* infestations in buffalo calves at small holders' farms in Lahore

Parameters	Animal Examined	Positive Cases	Negative Cases	Prevalence (%)	P-value (p<0.05)	Is Discrepancy Significant (P < 0.05)
<b>Age</b>						
1-4 weeks						
5-10 weeks	96	23	73	6.23	0.987	No
11-20 weeks	156	37	119	10.03		
	117	27	90	7.32		
<b>Gender</b>						
Male	190	49	141	25.79	0.328	No
Female	179	38	141	21.23		
<b>Health Status of Calves</b>						
Healthy	293	57 (19.45)	226	19.45	0.072	No
Sick	76	32(28.95)	44	28.95		
<b>Health Status of Mother</b>						
Healthy	315	67	258	21.27	0.644	No
Sick	54	13	41	24.07		
<b>Breed</b>						
Nili Ravi	261	52	209	14.09	0.140	No
Nondescript	108	35	73	9.49		

calves were 25.79 % and 21.23 % respectively. No Significant difference was observed regarding the *Toxocara vitulorum* infestations between male and female calves.

#### Health Status of Calves

After fecal analysis, it was concluded that number of non-infected calves in healthy and sick animals were 236 (80.55 %) and 54 (71.05 %) respectively. While infected calves in healthy and sick animals were 57 (19.45 %) and 22 (28.95 %). There was no significant difference (p<0.05) between the groups regarding the *Toxocara vitulorum* infestations on the basis of their health status.

#### Health Status of Mother

We get informed that number of sick and healthy mothers of calves were 54 and 315 respectively. 13 calves (24.07%) were infected with *Toxocara vitulorum* infestation whom mother was sick, while 67 calves (21.27%) were infected with *Toxocara vitulorum* whom mother was healthy. No

significant difference was observed among the calves with respect to *Toxocara vitulorum* infestation on the basis of their mother health status.

#### Coat Condition of Calf

Out of 369 buffalo calves, 280 calves (75.88%) had normal body coat, while 89 calves (24.12%) had abnormal body coat. Number of calves infected with *Toxocara vitulorum* were 27 (30.34%) and 58 (20.71%), in calves with abnormal and normal body coat respectively. No significant difference was observed among the calves with respect to *Toxocara vitulorum* infestation on the basis of coat condition of calves.

#### Breed

Prevalence of *Toxocara vitulorum* infestations in Nili Ravi and Nondescript breeds was 14.09% and 9.49% respectively. Data showed that positive cases observed in Nili Ravi and Nondescript breeds were 52 and 35 respectively. A significant difference

( $p < 0.05$ ) was observed between the breeds regarding the *Toxocara vitulorum* infestations

#### Weaning Time

On the basis of weaning time buffalo calves were divided into three groups namely weaning at birth (Group A), weaning at day 30 (Group B), weaning at day 45 or more (Group C). Out of total 87 buffalo calves recorded as positive against *Toxocara vitulorum* infestations, 22 (22.68%) belonged to category A, 37 (39.36%) belonged to category B and 28 (30.77%) belonged to category C. On the basis of weaning time, no significant difference ( $p > 0.05$ ) was observed between the buffalo calves regarding the *Toxocara vitulorum* infestation.

#### DISCUSSION

There is a wide variety in the rate of calf-hood ailments, with generous effects on numerous business dairy operations. Notwithstanding the cost of treating debilitated calves, the monetary results may incorporate expanded mortality, lessened development, and expanded age and trouble at first calving (Sivula et al., 1996; Rossini, 2004; Stanton et al., 2012). Gastrointestinal and respiratory problems result in estimated loss of \$33.46 and \$14.71 per pre weaned calf if diseased (Kaneene and Hurd 1990). Depending upon the immune status of calves, mortality risk counted to be about 2.1 to 14 % in different epidemiological studies (Waltner-Toews et al., 1986; Gulliksen et al., 2009). Difference in disease prevalence in different studies might be due to variation in calves age, size of herd, geography etc. size of farm, perinatal treatment, feeding, genetics, housing and other environmental factors are observed as risk factors (Lundborg et al., 2005).

Till now, no other data was documented regarding the *T. vitulorum* infestations in calves in Lahore region. Moreover, no sufficient data available against incidence of *T. vitulorum* infection in calves. In our study, the prevalence observed to be (23.58%) which was relatively low as documented by Srikitjakarn et al. (1987), almost 58% prevalence of disease in calves

of age of first three weeks. In Vietnamese calves aged 1-2 months, disease was prevalent up to 8 % as compared to buffalo and cattle calves of age of more than 3 months in which 22.6% disease prevalence was observed (Srikitjakarn et al., 1987; Holland et al., 2000).

The course of disease resulted in our study was almost the same as documented in Murrah buffalo (Jones et al., 2009). Observed fecal egg count range was the same as counted earlier in buffalo calves. In previous published data, the range of disease prevalence was within the range as observed in our studies (Baruah et al., 1981; Rekwot and Ogunsusi 1985; Rao et al., 2000; Rajkhowa and Hazarika 2001; Mahieu and Naves 2008).

Comparison between the reported studies indicating the prevalence of Toxocariasis seems to be difficult as results of associated risk factors and diagnostic techniques may vary in different studies. Variation in *T. vitulorum* prevalence in different geographical zones might be due to various reasons such as diverse ecosystem, changed animal husbandry practices, herd size and immune status of animals against infectious diseases (Dorny et al., 2015). Main risk factors detected in our studies were; age, gender and diarrhea.

Association between strongyle infection and *T. vitulorum* infestations is not clearly understood. More studies are required on large clinical cases to find out the connotation between the both type of infections. In buffalo calves, documented clinical signs in case of toxocarisis include eczema, poor body condition, scour resembled stools with foul smell and bloat (Stanton et al., 2012). Calves suffering from Toxocariasis may have pale-black colored diarrhea (Sivula et al., 1996; Rast et al., 2013). A correlation between disease incidence and fecal consistency was also observed in our studies. Need of large clinical trial still persist to clarify the statement that disease is more prevalent in calves with age less than three months of age.

Outcome of our study was that *T. vitulorum* infection persist in buffalo calves aged four

to eight weeks in outskirts of Lahore. There is a need of extension educations of farmers to aware them regarding the potential risk factors and control of the disease. Timely use of anthelmintic such as albendazole or levamisole can give beneficial results to control the disease specially where disease is prevalent like in outskirts of Lahore.

#### Conflict of interest

The authors declare that they are not in a situation of conflicting interests.

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