Orginal Research Article

Comparative Efficacy of Different Anthelmintics in Treatment of Swamp Buffalo Naturally Infected with Gastro-intestinal Parasites

ABSTRACT

The present study aimed to evaluate the comparative therapeutic efficacy of different anthelmintics like albendazole, levamisole, the combination of tetramizole and oxyclosanide; levamisole and triclabendazole against gastrointestinal (GI) parasites in buffalo. A total of 100 buffaloesnaturally infected with GI parasites were selected from Sylhet region during 2015-16and divided into 5 equal groups. 1 bolusEndokil®/80 kg body weight for Group A, 1 bolusRalnex®/41-75 body weight kg for Group B, 1 bolusLevanid®/100-150 kg body weight for Group C, and 1 bolusTrilev®/75 Kg body weight for GroupD were administrated per orally from 4 different renowned companies in Bangladesh. Buffalos of group E were kept as a control group.All the animals were evaluated for the intensity of infection before treatment (0 days) and after treatment (7^{th}, 14^{th}, 21^{st}, and 28^{th} days).Fecal samples were collected and estimatedeggs per gram of feces (EPG) by McMaster technique.Efficacy was calculated based on EPG after the use of anthelmintics. Among the four drugs, the highest efficacy was found withTrilev®(levamisole+triclabendazole) which reduced the EPG count to 87.61%. The lowest efficacy was found in the case of Endokil® (albendazole) which reduced the EPG count to 42.99% on the 28^{th} day. From the findings, it was clear that the mean of the four drugs was dissimilar in efficacy, and thereby the Trilev®(levamisole+triclabendazole) performed better than the other three.

Keywords: Anthelmintics, swamp buffalo, parasites, infestation, EPG.

1. INTRODUCTION

Buffaloes are considered one of the most important sources of milk and meat production [1, 2]. However, they can become infected with different types of gastro-intestinal parasites resulting in health deterioration, leading to substantial economic losses [3, 4]. According to the Department of Livestock Services (DLS) of Bangladesh, the contribution of the livestock sector to the gross domestic product (GDP) is 1.90% with GDP growth rate of livestock at 3.10% [5]. Of all domestic animals, the Asian buffalo holds the greatest promise and potential for production [6]. Buffaloes play an important role in farmers' economic life in Bangladesh. About 80% people of Bangladesh live in the village and most of them are fully or partially dependent on agriculture. Buffalo has a significant contribution to GDP through the production of meat, milk, and skin representing about 27.0%, 23.0%, and 28.0%;

respectively to the total production from the livestock sector in Bangladesh [7]. According to the estimate of the Bangladesh Bureau of Statistics (BBS) 2021-22, the current buffalo population in Bangladesh is about 1.5 million [8]. In Sylhet region, the village farmers were dependent upon the buffaloes mostly for draught and meat purposes, being an integral part of the farming system in this area. It is economically important in this region and could be used as a “small tractor” for farmers and its milk and meat are nutritionally rich. Maximum day time the buffaloes were grazed in the pasture land harvested paddy fields, and along roadsides and fulfilled their physiological demands.

Gastrointestinal parasitic diseases are encountered by the livestock sector of Bangladesh and is thought to be one of the major constraints in the development of dairy cattle worldwide [9, 10]. Helminths are a primary factor in the reduced productivity of ruminants in many parts of the world, particularly in developing countries where nutrition and sanitation are generally poor [11]. The chronic insidious form of helminthiasis is much more common and is associated with greater economic losses than acute diseases and many other lethal infectious diseases [12].Among the parasitic diseases, GI parasites are such as *Bunostomum*sp.,*Haemonchus*sp.,*Trichostrongylus*sp.,*Cooperia*sp.,*Oesophagostomum*sp.,*Trichuris*sp. and *Strongyloides*sp.,*Fasciola*sp.,*Paramphistomum*sp. are most common [13]. Anthelmintics are used traditionally as an integral part of helminthic control strategies for grazing livestock to prevent production losses from parasitic infections. The continuous and indiscriminate use of the same anthelmintics over years together as the sole means of control is now failing due to the emergence of resistant strains of helminths [14]. Resistance to the commonly used anthelmintics in GI parasites of animals has become an increasingly widespread problem throughout the world [15]. There are different combined preparation of triclabendazole and levamisole throughout the world. In Bangladesh, only a combination of triclabendazole and levamisole is present and used as a broad-spectrum anthelmintic [16]. The anthelmintic activities and therapy of albendazole, levamisole, and ivermectinhave been studied in buffalo with variableefficacy [17]. So, the present study is designed to know about the drug efficacy of different anthelmintics used in buffaloes.

2. MATERIALS AND METHODS

The experiment was conducted in the laboratory of the Department of Medicine, Faculty of Veterinary and Animal Sciences, Sylhet Agricultural University, Sylhet, Bangladesh during 2015-16. In this experiment albendazole, levamisole, combined preparation of tetramisole + oxyclosanide, and levamisole + triclabendazole were used to evaluate their anthelmintic efficacy based on EPG count. The fecal egg count reduction (FECR) test is widely used and the most accepted test to monitor anthelmintic efficacy test in the field [18].

2.1 SELECTION OF BUFFALO

A total of 100 buffaloes were selected for this study which were suspected to suffer from single or mixed parasitic infestation. These buffaloes were divided into 5 equal groups (A, B, C, D, and E). All these buffaloes were maintained under nearly identical conditions. They were kept in the door at night and part of the day. They were on average 3-5 years of age, detected by dentition [19]. Fecal samples were collected from 100 buffaloes and examined to find out the eggs of parasites. EPG of feces was detected by the McMaster technique [3, 20].

2.2 EXPERIMENTAL DRUGS

A total of 4 types of bolus of 4 different preparations were selected at first and then collected from the local market. Bolus, their composition, and the name of the producer company are

given in table 1.

Table 1. Composition and name of the producer company of the bolus used in the experiment

SL. No.	Trade name	Composition	Company
1.	Endokil®	Albendazole	ACI animal health Ltd
2.	Ralnex®	Levamisole	Novartis Ltd
3.	Levanid®	Tetramisole+Oxyclozanide	The Acme laboratories
4.	Trilev®	Triclabendazole+Levamisole	Square pharmaceuticals Ltd.

2.3 EXPERIMENTAL SCHEDULE

Among the 5 groups, one group (E) was kept as control other three groups were treated with 4 drugs as per the following schedule (Table 2).

Table 2. Drugs with dose and route of administration for Buffalo

Group	Trade Name	Trade Dose and route
A	Endokil®	1 bolus/80 kg body weight; PO
B	Ralnex®	1 bolus/41-75 body weight kg; PO
C	Levanid®	1 bolus/100-150 kg body weight; PO
D	Trilev®	1 bolus/75 Kg body weight; PO
E (Control)	Null	Null

Here, 1 bolus Endokil®contains 600mg albendazole, 1 bolus Ralnex®contains 600mg livamisole, 1 bolus Levanid® contains 1.4gm oxyclozanide + 2gm tetramisole, and 1 bolus Trilev®contains 600mg livamisole+ 900mg triclabendazole. All 5 groups of buffaloes were observed for 28 days after treatment and the following parameters were studied before treatment (0 days) and after treatment (7^{th}, 14^{th}, 21^{st}, and 28^{th} day) with 4 drugs.

2.4 COLLECTION OF FECAL SAMPLE

The fecal sample was collected directly from the rectum of each buffalo. The samples were numbered according to the neck belt number of the buffalo. In an extra sheet, the neck belt number of the buffalo, date of collection, age of the animal, health condition, and other particulars were recorded. Samples were transferred immediately after collection in sterile zipper bags to store in an ice box and then sending it to the laboratory for examination.

2.5 DATA ANALYSIS

Data were collected based on EPG and subjected to one-way ANOVA statistical analysis (Microsoft Excel 2013)to evaluate the differences among the mean effect of 4 drugs. All the analyses were performed at the level of $P<0.05$.

3. RESULT

All 100 buffaloes were found to be affected with mixed parasitic infection at day 0. These parasites were *Fasciolagigantica*, *Haemonchus*sp.,*Strongyles*sp.,*Paramphistomum*sp.,*Trichuris*sp.,and *Bunostomum*sp.Group

A, mean fecal egg count (FEC) before treatment was 478.57±37.57EPG but after treatment with Endokil®, the mean FEC was reduced to 437.14±15.23, 385.00±8.86, 331.43±11.42 and 272.85±27.21 EPG at day 7, 14, 21 and 28 respectively. In this group, the reduction of EPG count was 8.65%, 19.55%, 30.75%, and 42.99% on days 7, 14, 21, and 28 respectively.

In group B the mean EPG count before treatment was 365.40±11.86 EPG but after treatment with Ralnex®,the mean EPG count was reduced to 298.57±11.42, 215.71±20.08, 167.29±11.96 and 109.05±15.01 at day 7, 14, 21 and 28 respectively. In this group, the reduction of EPG count was 18.29%, 40.9654.22%, and 70.16% on days 7, 14, 21, and 28 respectively.

In group C the mean EPG count before treatment (0 days) was 494.21±28.61 but after treatment with Levanid® the mean EPG count was reduced to 328.57±15.40, 235.78±12.86, 122.43±23.23 and 92.86±8.12at day 7, 14, 21 and 28 respectively. In this group, the reduction of EPG count was 33.52 %, 52.29%, 75.23%, and 81.21% on days 7, 14, 21, and 28 respectively.

In group D the mean EPG count before treatment (0 days) was 594.13±32.10 but after treatment with Trilev®, the mean EPG count was reduced to 380.21±11.90, 255.78±19.61, 121.12±32.12 and 73.61±12.23 at day 7, 14, 21 and 28 respectively. In this group, the reduction of EPG count was 36.01%, 56.95%, 79.61%, and 87.61% on days 7, 14, 21, and 28 respectively.

In group E (control) the mean EPG count at day 0 was 315.12±22.85 but the mean EPG count increased to 417.14±39.91, 465.12±17.12, 510.14±31.46 and 575.32±12.92 at day 7, 14, 21 and 28 respectively. In this group, the increase in EPG count was 32.38%, 47.60%, 61.89%, and 82.57% on days 7, 14, 21, and 28 respectively.

Table 3. Comparative efficacy of modern anthelmintics against gastro-intestinal helminthiasis in Buffaloes.

Group	Pre-treatment (EPG)	Post-treatment (EPG)							
	Day 0 (Mean±SE)	Day 7 (Mean±SE)	FECR in 7th days	Day 14 (Mean±SE)	FECRin 14th days	Day 21 (Mean±SE)	FECRin 21st days	Day 28 (Mean±SE)	FECRin 28th days
A Endokil®	478.57±37.57	437.14±15.23	8.65	385.00±8.86	19.55	331.43±11.42	30.75	272.85±27.21	42.99
B Ralnex®	365.40±11.86	298.57±11.42	18.29	215.71±20.08	40.96	167.29±11.96	54.22	109.05±15.01	70.16
C Levanid®	494.21±28.61	328.57±15.40	33.52	235.78±12.86	52.29	122.43±23.23	75.23	92.86±8.12	81.21
D Trilev®	594.13±32.10	380.21±11.90	36.01	255.78±19.61	56.95	121.12±32.12	79.61	73.61±12.23	87.61
E (Control)	315.12±22.85	417.14±39.91	-	465.12±17.12	-	510.14±31.46	-	575.32±12.92	-

World Association for the Advancement of VeterinaryParasitology (W.A.A.V.P.) Guidelines for Evaluating the Efficacy of Anthelmintics in Ruminants (Bovine and Ovine) was compared to this study [21]. The mean value of EPG obtained on the 28th day by administration of 4 different drugs is compared. The obtained P-value was 0.002, where the significance level was 0.05.

4. DISCUSSION

A fecal egg count testis recommended to evaluate the efficacy of anthelmintic drugs [18, 22]. *Fasciola* spp., *Haemonchus* spp., *Strogyles* spp., *Paramphistomum* spp., and *Trichuris* spp. *Bunostomum* sp. was detected during the pre-treatment study which was also observed by others [23, 24]. Moreover geographical and topographical condition favors the growth and multiplication of parasites in buffalo. So the percentage of mixed parasitic infection in buffalo in Bangladesh is very high.

Among the four groups of drugs applied, the efficacy is found best in the case of Trilev® (triclabendazole+levamisole) and comparatively poor in the case of Endokil® (albendazole). Trilev® (triclabendazole+levamisole) has reduced the mean EPG count at 36.81%, 56.95%, 79.61%, and 87.61% at day 7, 14, 21, and 28 respectively in the D group while Endokil® reduced the mean EPG count at 8.65%, 19.55%, 30.75% and 42.99% at day 7, 14, 21 and 28 respectively in A group. These findings were almost similar to the findings of some others [25, 26, 27]. It indicated that the mean of the four drugs was dissimilar in efficacy and thereby the Trilev® effects were better than the other three drugs.

In contrast with Endokil®, Levanid® (tetramisole+oxyclozanide) was performing better an 81.21% reduction of the EPG count on the 28th day. Higher rates of therapeutic efficacy in the case of tetramisole and oxyclozanide treatment were observed by others [28, 29]. The efficacy of albendazole and levamisole individually against helminths parasites is encouraging but variable this findings of the present study were similar to the findings of some other authors [30, 31]. However, the individual treatment either with triclabendazole or levamisole sometimes becomes resistant [32, 33]. So, now a day to overcome the development of resistance and for the synergistic effect, the combined preparation is well practiced by many authors [34]. In the present study combined preparation with triclabendazole and levamisole was found to be highly encouraging. The difference in efficacy may be due to anthelmintic resistance, compositional, and quality variation [35].

5. CONCLUSION

Among the four groups, the highest efficacy was found in the case of Trilev® (levamisole + triclabendazole) which reduced EPG by 87.61%, and the lowest efficacy was found in the case of Endokil® (albendazole) which reduced the EPG 42.99% in 28th day. From the findings, we can conclude that synergistic actions of levamisole and triclabendazole combinations reduced the EPG count and were very much helpful in buffalo parasitic treatment.

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