



COMPARATIVE TESTING OF SOME INSECTICIDES FOR CONTROL OF MALLOPHAGOSIS IN CHICKENS

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ABSTRACT

An investigation was performed to compare the efficacy of some insecticide drugs for control of mallophagosis in chickens. In this trial, 24 chickens at the age of 4 months were used that were experimentally infected with chewing lice from the following species: *Menopon gallinae*; *Eomenacanthus stramineus*; *Menacanthus cornutus* (Amblycera) and *Goniocotes gallinae* (Ischnocera), randomly allotted to three experimental and one control groups. The birds from experimental groups were treated with one of the following insecticide preparations: 0.1 % solution of EctominTM100 EC, Ciba-Geigy (100 g/l cypermethrin); TapilanTM B, Dorvet Ltd. (2 % permethrin) and BolfoTM Puder, Bayer Health Care (1 % propoxur). The intensity of infection was determined at post treatment hours 2, 4 and 6, on the day that followed the treatment and subsequently once weekly for one month after the antiparasitic treatment of experimental groups. As early as the 6th post treatment hour, the lice infection was eliminated in all treated groups and this result was retained until the end of the experiment. The results showed that the single treatment at proper doses with the preparations containing the insecticide substances cypermethrin, permethrin and propoxur, removed completely the infection with chewing lice in chickens.

Key words: Phtiraptera, chewing lice, biting lice, chickens, cypermethrin, permethrin, propoxur

INTRODUCTION

Mallophagoses are ectoparasitic entomoses on birds and mammals, whose agents belong to the Mallophaga paraphyletic entomological group. They are systematized in the suborders Amblycera and Ischnocera of the Phthiraptera order (1). They are popular as biting lice (2, 3) or chewing lice (4). Apart with feathers, hair and epidermal cells, some species from the Amblycera suborder also feed on blood (5, 6). Being haematophages, they participate directly in the transmission of some microbial pathogens (7, 8). It was also established that Mallophaga interfere with thermoregulation (9), sensitize and intoxicate the organism of their hosts (10). The cited data determine the pathogenicity of biting lice as very variable and this entails a reconsideration of the importance of the problems with regard to the detrimental impact of these ectoparasites and the control of entomoses caused by them.

Until now, in Bulgaria as well as at a global scale, the data about the therapy of mallophagosis in chickens are very scarce.

In the past, a common approach for treatment was the bathing or immersing the birds in insecticide solutions or suspensions (11). It is used now as well (12), but is more often replaced by spraying (13, 14). Some attempts for parenteral control of avian mallophagosis are reported too (15).

The few studies in this field, the importance of poultry industry for the national economy and the existing deficiency of insecticides intended for use in bird at our pharmaceutical market motivated our interest to perform investigations on that subject.

The present study aimed to test the efficacy of the following insecticide preparations: 0.1 % solution of EctominTM100 EC, Ciba-Geigy (100 g/l cypermethrin); TapilanTM B, Dorvet Ltd. (2 % permethrin) and BolfoTM Puder, Bayer Health Care (1 % propoxur).

MATERIALS AND METHODS

For experimental infection, 24 Anak chickens at the age of 4 months were used. After clinical, laboratory and parasitological

examinations, a classical artificial invasion was performed with 100 viable insects – 25 of each of the following species: *Menopon gallinae*; *Eomenacanthus stramineus*; *Menacanthus cornutus* (Amblycera) and *Goniocotes gallinae* (Ischnocera). The infection material was obtained from donor chickens that were placed in individual polyethylene bags together with a cotton swab soaked in diethyl ether, for 7 minutes, the head remaining outside. Afterwards, the bird was removed from the bag and its feathers were vigorously ruffled over a sheet of white smooth paper. After regaining their normal motility, the insects were counted and placed in individual Petri dishes and from there, were spread on the feathers of birds. Wing marks (Hauptner Ltd., Germany) were used for identification of chickens.

Immediately after the infection, the chickens were randomly divided into 4 groups with 6 chickens in each: 3 experimental and 1 control, and were placed in separate premises without contact among groups.

By the 60th day after the infection, the intensity of infection was determined in all four groups and then the birds from the three experimental groups were treated as followed:

Experimental group № 1 (Cy) – by

immersing of the entire body and the head in 0.1 % solution of EctominTM100 EC, Ciba-Geigy (100 g/l cypermethrin);

Experimental group № 2 (Pe) – by powder dusting of the feathers with TapilanTM B powder, Dorvet Ltd. (2 % permethrin);

Experimental group № 3 (Pr) – by powder dusting with BolfoTM Puder, Bayer Health Care (1 % propoxur).

Control group (Co) – infected and untreated. The invasion and its intensity were detected (16) on post treatment hours 2, 4 and 6 (only in experimental birds), on the following day and once weekly for one month after the treatment (in all birds).

The statistical analysis of data was performed by the Student's t-test at a confidence level of 0.95.

RESULTS

The results from the comparative investigation on the therapeutic effect of tested ectoparasitic substances in 24 chickens with experimental mixed Mallophaga infection, are presented in Table 1.

Table 1: Dynamics of the intensity of an experimental mixed infection with biting lice according to Harshbarger & Rafensperger (1961) in control –untreated chickens (Co) and in chickens treated with cypermethrin (Cy); permethrin (Pe) or propoxur (Pr)

	Time prior to or after treatment	Intensity of infection, mean \pm SEM			
		Cy (n=6)	Pe (n=6)	Pr (n=6)	Co (n=6)
Post treatment	Prior to treatment	36.8 \pm 8.3	35 \pm 6.8	29.4 \pm 6.7	31.5 \pm 7.7
	2 hours	6.6 \pm 1.7**	9.6 \pm 2.2**	7.4 \pm 1.7**	31.5 \pm 7.7
	4 hours	1.4 \pm 0.7***	1.6 \pm 0.2***	1.4 \pm 0.2***	31.5 \pm 7.7
	6 hours	-	-	-	31.5 \pm 7.7
	24 hours	-	-	-	30.9 \pm 8.3
	7 days	-	-	-	42.6 \pm 7.9
	14 days	-	-	-	44.7 \pm 7.8
	21 days	-	-	-	51.1 \pm 8.3
	30 days	-	-	-	55.4 \pm 8.3

* - $p < 0.05$; ** - $p < 0.01$; *** - $p < 0.001$

The figures showed that in all experimental groups, the intensity of infection decreased

sharply as early as the 2nd post treatment hour at a high level of statistical significance (p

< 0.01). By the 4th hour, only single insects remained viable in all treated groups ($p < 0.001$), and their motility was strongly reduced. By the 6th hour, all chewing lice were dead. Infection has not been detected until the post treatment day 30. In all control chickens, the infection persisted with slightly

increased intensity by the end of the experiment that was anticipated provided the continuous reproduction of insects.

Figure 1 depicts graphically the dynamics of the efficacy of tested ectoparasiticide formulations in all three groups of treated chickens.

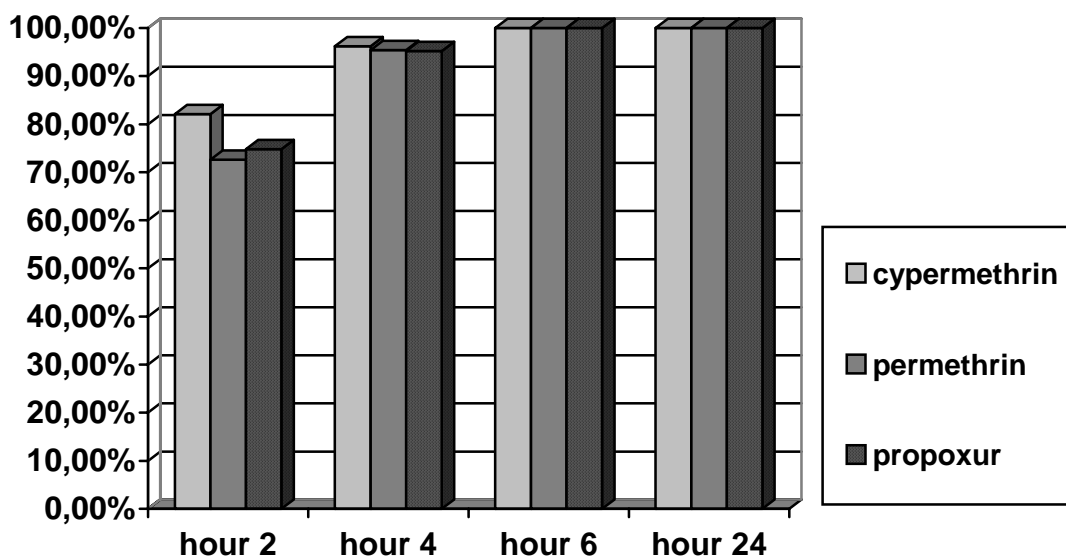


Figure 1. Dynamics of the efficacy of cypermethrin; permethrin and propoxur, 2; 4; 6 and 24 hours after treatment of chickens with experimental mixed biting lice infection.

By the 2nd hour after treatment, the efficacy ranged between 72.6 % and 82.1 %. The two powders – TapilanTM B (2 % permethrin) and BolfoTM (1 % propoxur), showed a slightly lower efficacy compared to the used concentration of the third preparation: 0.1 % solution of EctominTM100 EC (100 g/l cypermethrin). By the 4th hour, the efficacy percentage was almost equal: 95.2 % for BolfoTM and 96.2 % for 0.1 % EctominTM100 EC. It has to be emphasized that both powder preparations increased their effectiveness. On post treatment hours 6 and 24, all preparations were 100 % effective against biting lice in chickens.

Following the treatment as well as during the 30-day period after the application of insecticide preparations, there were neither signs of intoxication nor alterations in the general condition and the appetite of treated chickens.

DISCUSSION

The results from the present experiment demonstrated that the insecticide compounds cypermethrin; permethrin and propoxur, applied at adequate concentrations, were 100 % effective against biting lice on chickens 6

hours after the treatment.

The fact that all medications were applied only once and that there were no infected chickens up to the 30th day post treatment, deserves to be mentioned. Taking into consideration that the embryonic development of Mallophaga, from the time of egg laying to the hatching of the first nymphs lasts 4 to 8 days (17), as well as the fact that the biological cycle of chewing lice is completed for 2– 3 weeks (8), it could be stated that the single treatment with each of the three insecticides tested in the present experiment stops entirely the invasion with the chewing lice species, used for experimental infection in our trial. We could not, however, assume categorically whether it was due to the retarded effect of preparations or possibly, to their ovocide effect. Bearing in mind the published opinions of other authors, that most preparations for control of mallophagosis in chickens have a very weak or no ovocide effect (14, 18), the hypothesis of the retarded action of the tested preparations, resulting in killing of nymphs after hatching, could be logically supported.

Analyzing the results from the present experiment, it could be summarized that the single application of preparations, containing the synthetic pyrethroids cypermethrin and

permethrin, as well as propoxur – a representative of the group of carbamate insecticides, eliminated completely the chewing lice infestation in chickens. Both the methods of immersing the body and the powder dusting of birds were highly efficient.

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