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Comparative Efficacy of Fipronil, Ivermectin and Clove Oil (*Eugenia caryophyllata*) against *Psoroptes cuniculi* Mites in Rabbits (*Oryctolagus cuniculus*)

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ABSTRACT

The present study was conducted to evaluate the therapeutic efficacy of fipronil, ivermectin and clove oil against frequently reported *Psoroptes cuniculi* mites which are responsible for causing intense pruritus and scab formation on skin, ear pinna and ear canal in domestic rabbits (*Oryctolagus cuniculus*). The rabbits were divided into 3 groups *viz*. A, B and C each having 10 rabbits. These groups were topically treated with fipronil, ivermectin and clove oil on days 0, 7, 14 and 21. Pre and post treatment evaluations were made on the basis of clinical improvement and microscopic examination of skin scrapings in each group. Results revealed that all 3 drugs were effective against *P. cuniculi*; but ivermectin led recovery was quicker than rest of the two drugs. All three groups were free of lesions and mites on day 21 of treatment.

Key words: Clove oil, Fipronil, Ivermectin, *Psoroptes*, Rabbit.

Psoroptes cuniculi is the most common and cosmopolitan mange mite that causes otitis and skin disease in the domestic rabbit (*Oryctolagus cuniculus*) which is a small mammal, belonging to family *Leporidae* and used as source of food, fur, wool, as well as pet and experimental animal. *P. cuniculi* is obligate, non-burrowing, astigmatid ectoparasite of family Psoroptidae (Colebrook and Wall, 2004) which scatters more rapidly through farm rabbits (Swarnakar *et al*., 2014) and infests internal surface of the pinna and external ear canal which causes intense pruritus, encrutation (Macchioni *et al*., 2004), anorexia, emaciation and death in extreme cases. Stress and poor husbandry conditions are the major risk factors. As *Psoroptes* is very commonly encountered condition of rabbits presented at Pet Centre, the study was designed to evaluate comparative efficacies of conventional drugs with clove oil which is a promising herbal medicine against *Psoroptes cuniculi*, as no previous studies are documented in Pakistan.

The present study was conducted on clinical cases of *P. cuniculi* in domestic or farm rabbits received during 2019-2020 period from different areas at Pet Centre, University of Veterinary and Animal Sciences, Lahore (Fig 1). The mite suspected cases were referred to Pet Centre diagnostic laboratory for investigation and confirmation.

• Laboratory investigation

Skin scraping samples (keratinized debris, scales and crusts) were obtained from dermatological lesions and digested in 10% KOH for 20-30 minutes (Foreyt 2013) followed by examination under 4X and10Xlens (LAMBOMED Lx 400) (Fig 2).

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• Grouping of samples

- After confirmation of 100 cases of *Psoroptes cuniculi,* 30 cases were randomly selected and divided into three groups *i.e*. group A, group B and group C, with ten rabbits each. Group A rabbits were topically treated with 1% ivermectin (Ivomec spot on, Merial Pvt. Limited) @ one drop per 500 g body weight on back of neck and in ear canal on days 0, 7, 14 and 21.
- The Group B rabbits were treated with 10% Fipronil (Frontline spot on, Merial Pvt. Limited) topically applied on days 0, 7, 14 and 21st with dosage of 5 mg per kg body weight.

- Group C rabbits were treated with freshly extracted pure clove oil treatment was given on day 0, 7, 14 and 21st with dosage of 2-3 mL per rabbit.

Post-therapeutic evaluation was performed on the basis of microscopic examination of skin scraping at various intervals from day 0, 7, 14 and 21th. The evaluated parameters during this study included body weight, body itching, feed intake and eosinophils count.

Statistical analysis

The data was analyzed statistically by independent sample's *t* test by using SPSS 23.



Fig 1: Suspected clinical case of *P. cuniculi*.



Fig 2: Microscopic detection of *P. cuniculi*.

Body weight

Body weight was recorded on days 0, 7, 14 and 21 in all 3 groups. In groups A and B statistical analysis revealed a significant gain of body weight from days 0-21 and days 0-14, respectively followed by non-significant decrease of body weight on day 21. In group C, there was no significant increase in body weight till day 7 followed by slight gain of body weight on days 7-21 (P>0.05) (Fig 3).

Feed intake

In groups A and B there was no significant increase (P>0.05) in feed intake during days 0-14 followed by a slight decrease in feed intake by day 21. In group C, there was no improvement in feed intake till day 21. Statistically groups A, B and C were significantly different from each other on the basis of level of feed intake (P>0.05) (Fig 4).

Body itch

All the rabbits in group A, B and C were showing signs of pruritus at the beginning of this study. In group A, severity of continuous body itch was reduced to minimal level on day 7 followed by complete recovery on day 21. Whereas, group B and C showed moderate recovery from pruritus during days 14-21(Fig 5).

Allergic response associated eosinophil count

In group A, B and C differential leukocyte count (DLC) revealed a significantly increased eosinophils count on day 0 prior to the initiation of treatment followed by initiation of gradual and statistically significant decrease of eosinophil count from days 7-21 in all three groups (p>0.05) (mean eosinophil count shown in Fig 6). The increase in eosinophil counts in the intial infection might be due to raised plasma histamine concentration resulting into release of eosinophils into circulation which tend to return to normal after treatment (Singla and Juyal 2000).

No relevant data on the use of ivermectin and fipronil spot on is available on rabbits. However, it has been successfully used through subcutaneous route against *P. cunicili* and *Notoedres cati* (Singla *et al*., 1996). The present

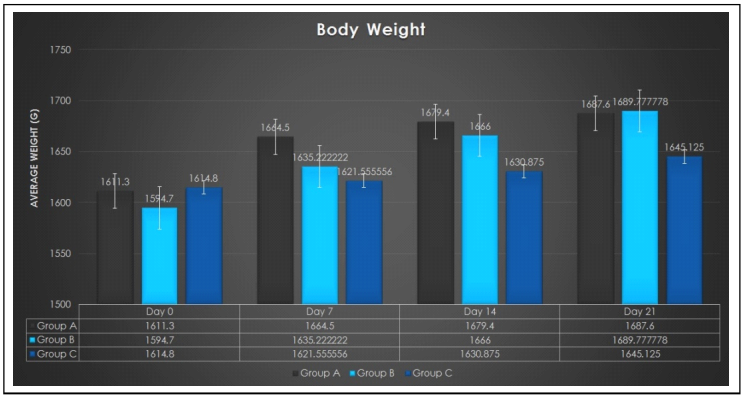

Fig 3: Body weight of rabbits before, during and after the treatment.

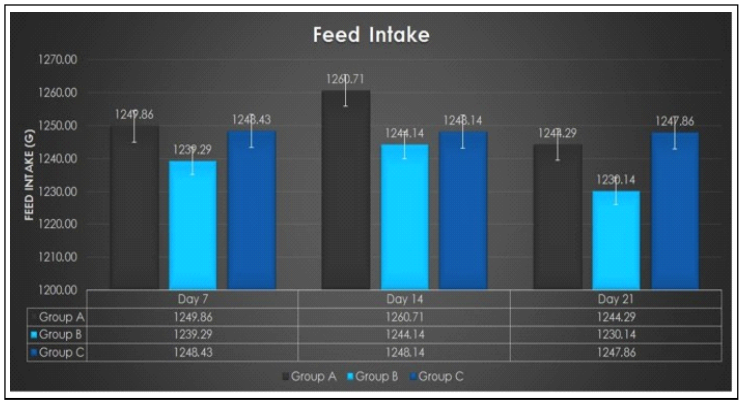

Fig 4: Feed Intake during treatment.

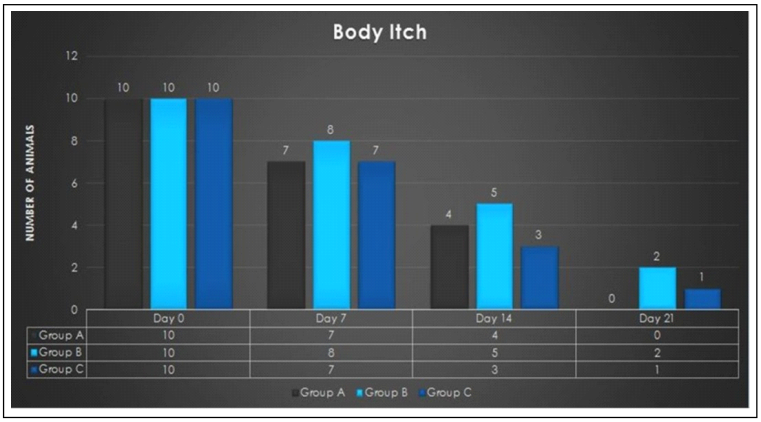

Fig 5: Body itch scoring (10=highest score, 1=lowest score, 0=no itch).

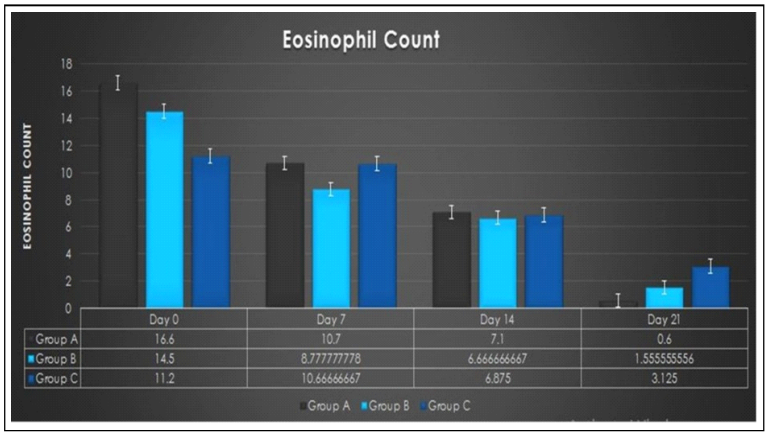

Fig 6: Eosinophilic count.

results of group A were in line with the study of Kalbe and Hansen (2012) who employed the single use of ivermectin spot-on in 10-20 kg dog as a single dose of 1.3 mL to treat skin mite. Whereas, single dose of 0.67 mL of fipronil spot on was used for dog weighing 2-10 kg for treating skin mites in dogs (Bonneau *et al*., 2010). Our results were in line for clove oil efficacy with the study of Fichi *et al*. (2007) in which the treatment with the essential oil cured all infected rabbits.

CONCLUSION AND ACKNOWLEDGEMENT

Results revealed that all 3 drugs were effective against *P. cuniculi*; but ivermectin led recovery was quicker than rest of the two drugs. All three groups were free of lesions and mites on day 21 of treatment.

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Conflict of interest

All authors declare that they have no conflict of interest.

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