

1 *Cheyletiella yasguri* Smiley, 1965 (Acarina: Cheyletiellidae) infestations in six
2 puppies in Kocaeli province of Turkey, and successful treatment with selamectin

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16 **Abstract:** Cheyletiellosis is a highly contagious infestation caused by *Cheyletiella*
17 mites, particularly in pets. This clinical case report was performed to give information
18 about canine cheyletiellosis in 45-days-old Poodle puppies showing mainly pruritus and
19 dandruff symptoms. Mites were detected in stereo microscopic examination of hair and
20 skin scraping samples collected from dogs brought to a private veterinary clinic in
21 Kocaeli province of Turkey. All collected materials were preserved in eppendorf tubes
22 containing 70% ethanol and sent to the parasitology laboratory for species
23 identification. Mite preparations for microscopic examination were prepared, and the
24 species causing infestations in puppies was identified as *Cheyletiella yasguri*. This case

25 is the first canine cheyletiellosis report in Kocaeli province of Turkey, and also the first
26 *C. yasguri* infestation in Poodle breed dogs in Turkey. Symptoms of pruritus and
27 dandruff were successfully resolved in a short time with the single-dose spot-on
28 formulation of selamectin administration, as well as routine combing of puppies and
29 environmental cleaning. The number of studies on *C. yasguri*, which can cause
30 infestations in humans, is limited in Turkey. Considering the increase in human
31 dermatitis cases caused by *Cheyletiella* species, it is concluded that more
32 comprehensive studies on the prevalence of cheyletiellosis in pets are required.

33 **Keywords:** Cheyletiellosis, *Cheyletiella yasguri*, Poodle, selamectin, Kocaeli

34 **1. Introduction**

35 Cheyletiellosis, which is colloquially known as walking dandruff or *Cheyletiella*
36 dermatitis, is a non-seasonal highly contagious ectoparasitic dermatosis caused by
37 *Cheyletiella* mites (Acarina: Cheyletiellidae) living on the skin surface of animals and
38 humans [1, 2]. The most important species causing cheyletiellosis for humans and
39 animals are *Cheyletiella parasitivorax* Megnin, 1878, *Cheyletiella blakei* Smiley, 1970
40 and *Cheyletiella yasguri* Smiley, 1965. It has been considered that *C. parasitivorax*, *C.*
41 *blakei* and *C. yasguri* mainly cause dermatosis in rabbits, cats and dogs, respectively [1,
42 3]. However, it has been reported that the host specificity of *Cheyletiella* spp. is not
43 very high, and they can cause infestation in different animal species [4, 5]. In addition,
44 all three species have zoonotic significance and may cause severe dermatitis
45 characterized by pruritic papular lesions in humans [6-8].

46 *Cheyletiella* mites feeding with lymph and other tissue fluids on the skin are large (270-
47 540 μm) and motile, and form pseudo-tunnels in the superficial epidermis of hosts [9,

48 10]. These mite infestations cause clinical symptoms in pets, especially in young
49 animals such as kittens and puppies. The infested puppies' clinical signs can be variable
50 from a mild non-suppurative dermatitis to severe scaling, erythema, pruritus and
51 papules. An inflammatory response commonly characterized by an exfoliative
52 dermatitis may also occur. The dry scale is the most prominent clinical signs of
53 cheyletiellosis, and it can be severe on the dorsum of affected dogs. Alopecia and
54 secondary skin infections can occur in case of severe infestation or chronic illness.
55 Crusty lesions at the tip of the pinnae resembling to the scabies lesions can be seen in
56 some dogs [4].

57 Cheyletiellosis has no sex and breed predilection. However, the disease is frequently
58 encountered in Cocker Spaniels. Weakness and unhygienic raising conditions make also
59 dogs more vulnerable to the infestations [2, 4]. The disease is usually caused by
60 asymptomatic carrier animals subsequently incorporated to the shelters or households.
61 Because *Cheyletiella* mites can easily transmit from one dog to another dogs [2].

62 There are several studies concerning cheyletiellosis in animals in Turkey, but most of
63 them are related to *C. parasitivorax* and *C. blakei* [11-14]. There are also studies
64 reporting *Cheyletiella* dermatitis in humans in Turkey [8, 15, 16]. However, information
65 on *C. yasguri* infestation of dogs in Turkey is scarce, except one study conducted
66 almost forty years ago in Istanbul province [17]. The main purpose of this study was to
67 emphasize the significance of *Cheyletiella* mites as etiological agents in six pruritic
68 Poodle puppies from Kocaeli province of Turkey and the successful treatment of
69 infestations with selamectin.

70 **2. Case history**

71 Six 45-day-old Poodle puppies (2 male, 4 female) out of nine dogs raising together and
72 showing itching and dandruff symptoms were brought to a private veterinary clinic in
73 Kocaeli province of Turkey in September 2020. The puppies were clinically examined,
74 and dandruff was observed, especially on the dorsum (Figure 1). Hair samples and skin
75 scrapings obtained from the puppies were microscopically examined. As a result of
76 stereo microscopic examination, motile mites between dandruff and hairs were detected.
77 In addition, a faecal examination was also routinely performed, and mites were also
78 detected in faeces of the puppies.

79 The collected materials were placed into eppendorf tubes containing 70% ethanol and
80 sent to the Parasitology Laboratory of the Faculty of Veterinary Medicine of Selcuk
81 University for the identification of mite species. The materials taken into petri dishes
82 were examined under a stereo zoom microscope, and *Cheyletiella* spp. (n: 32) and mite
83 eggs attached to the hairs were observed. Eight of the *Cheyletiella* mites were become
84 transparent in 10% potassium hydroxide (KOH) for 12 hours by checking periodically.
85 The mites were then rinsed in distilled water for 2 hours and transferred to 70% and
86 %99 ethanol respectively. After one day storing in each alcohol series, *Cheyletiella*
87 mites were mounted on slides using Canada balsam. *Cheyletiella* mites were identified
88 as *Cheyletiella yasguri* Smiley, 1965 (Figure 2) under a light microscope (Leica
89 DM1000) by using relevant literature [4, 5].

Please insert Figure 1 here

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Please insert Figure 2 here

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93 *Cheyletiella* mites can be easily distinguished from other mites thanks to their strong
94 hooked-shaped pedipalps and comb-like structures at the tip of their legs (Figure 3). In
95 other parasitic mites, there is a sucker or claw-like structure instead of that. The waist-
96 like narrowing at the midriff is also characteristic for *Cheyletiella* species [5]. The most
97 important morphological structure used to identify *Cheyletiella yasguri* is a heart-
98 shaped or Y-shaped sensory organ, namely solendo, which can be seen on the dorsal
99 side of genu I (Figure 4). It is used to differentiate *C. yasguri* from other members of
100 *Cheyletiella* genus. This organ is conical in *C. blakei* and global in *C. parasitivorax* [4,
101 18].

Please insert Figure 3 here

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Please insert Figure 4 here

103 The puppies and three other adult dogs were treated with selamectin' spot-on
104 formulation (Stronghold[®] 6%, Zoetis). The solutions in 0.25 ml tubes containing 15 mg
105 of active ingredient were applied on the skin surface between the shoulders of dogs on
106 the initial part of the neck. The owner of the animals was advised that dogs should be
107 combed in the days after treatment. Besides, all dogs were isolated from their
108 households, and all pens of the household were cleaned using hot water. After these
109 applications, no mites were found in dogs in control on the 15th day after treatment.
110 However, a second drug administration was performed 28 days after the first
111 administration.

112 **3. Discussion and conclusion**

113 *Cheyletiella* dermatitis is an important mite infestation that is closely related to human
114 medicine as well as veterinary medicine due to their quickly transmit ability to from
115 animals to humans, especially to the owners of the animals [2, 19]. *Cheyletiella* mites
116 cause dermatosis with or without pruritus commonly on the dorsum of the animals.
117 Mild to severe scaling/dandruff, hair loss, crusting, erythema, itching, rashes, redness
118 and papules are the most prominent signs of the infested animals [4]. These mites can
119 also cause severe skin irritation, rashes, itching and papular lesions in humans [7, 8].
120 Among pet animals, cheyletiellosis is mostly encountered in kittens, puppies and rabbits
121 [4]. *Cheyletiella* mites were reported in cats [11, 12, 14, 19, 20], rabbits [13, 18, 21, 22,
122 23] and humans [15, 16] in the studies conducted in Turkey. However, the number of
123 study on canine cheyletiellosis is scarce. *Cheyletiella yasguri* infestations were detected
124 in six 45-days-old Poodle puppies living in the same household in the current study. To
125 date, cheyletiellosis caused by *C. yasguri* in a six-months-old dog was reported in only
126 one study in Istanbul province of Turkey almost forty years ago [17]. Apart from the
127 study conducted by Tüzer [17], the literature review indicates that no *C. yasguri*
128 infestation was reported in dogs or any other mammals in Turkey. This study reports *C.*
129 *yasguri* infestations in six puppies for the first time in Kocaeli province of Turkey. It is
130 thought that *Cheyletiella* infestations in dogs may be caused by an asymptomatic carrier
131 dog coming from outside or living in the same household. It should be kept in mind that
132 phoretic transmission by insects may play a role in the spread of infestation [24].

133 *Cheyletiella yasguri* infestations have been reported in some dog breeds such as
134 Cavalier King Charles Spaniel, Cocker, Terrier, Miniature Poodle and Whippet in
135 Austria, India, Iran and Canada [9, 25-27]. Miller et al. [4] stated that canine
136 cheyletiellosis is frequently seen in Cocker Spaniel dogs. *Cheyletiella yasguri*

137 infestations were detected in Poodles in this study. In the study conducted by Tüzer
138 [17], data about the breed of the dog were not stated. Therefore, this is the first case
139 study reporting *C. yasguri* infestations in the Poodle breed dogs in Turkey.

140 Human *Cheyletiella* dermatitis cases are mostly due to contact with infested pets [4, 19].
141 Some studies reported that mites causing infestations in animals could simultaneously
142 cause dermatological problems in the owners of the animals [8, 11, 20]. This situation
143 can be solved by effective treatment of animals, spontaneously. In this study, *C. yasguri*
144 infestations were detected in six Poodle puppies, but there were no complaints about
145 mite infestation from the owners of the animals.

146 Although the treatment of canine cheyletiellosis is troublesome in the households
147 harbouring many dogs, the treatment process is generally successful in households
148 where fewer dogs live together. To effectively eliminate *Cheyletiella* mites, the infested
149 dogs and all in-contact dogs should be treated. In some cases, environmental treatment
150 may even be required depending on the severity of the infestation and the number of
151 dogs in the household [2-4]. A variety of systemic and topical ectoparasitic drugs are
152 used to treat and control cheyletiellosis in dogs [2]. Moxidectin, ivermectin, selamectin
153 and milbemycin oxime are commonly used macrocyclic lactones against cheyletiellosis
154 in animals. Pyrethroids and fipronil have also been commonly used for this aim [3, 5].
155 In the literature, the efficacy of milbemycin oxime [28], fipronil [29], ivermectin [19,
156 25] and selamectin [30] against canine cheyletiellosis was previously indicated.
157 Selamectin has been used against feline cheyletiellosis in Turkey [14]; however, there is
158 no report on the use of this acaricide in canine cheyletiellosis. In the present study, the
159 puppies and three other adult Poodle dogs in the same household were successfully
160 treated with spot-on formulation of selamectin (Stronghold® 6%, Zoetis). *Cheyletiella*

161 *yasguri* mites were eliminated by single dose selamectin administration with regular
162 combing of the animals and environmental cleaning with hot water.

163 In conclusion, *Cheyletiella yasguri* infestation was detected in six puppies for the first
164 time in Kocaeli province of Turkey. It was also detected in Poodle breed of dogs for the
165 first time in Turkey. Since the epidemiology of *Cheyletiella* mite infestation among
166 dogs is scantily known in Turkey, more comprehensive studies concerning mite
167 infestations in dogs are required. The high number of human *Cheyletiella* dermatitis
168 cases in Turkey have recently increased the significance of this subject as well [8, 15,
169 16].

170 **Conflict of interest**

171 Authors declare no conflict of interest.

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268 **Figure legends**

269 **1.** Figure 1. A Poodle puppy infested with *Cheyletiella yasguri* and dandruff on its
270 dorsum (original)

271 **2.** Figure 2. *C. yasguri*: female, dorsal (A), male, ventral (B), and eggs glued on a hair
272 (C) (original)

273 **3.** Figure 3. Hooked-shaped pedipalps (A) and comb-like structures at the tip of their
274 legs (B) (original)

275 4. Figure 4. *Cheyletiella yasguri*, heart-shaped sensory organ on genu I (original)

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