

Identification of Normal Retina's Variations in Kars Shepherd Dogs via Fundoscopic Examination ^{[1][2]}

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Summary

The purpose of this study was to use fundoscopic examination to identify normal variations in the retinas of Kars Shepherd Dogs, which are raised in northeastern Turkey, particularly in the province of Kars and the surrounding area. The study was carried out on 50 healthy Kars Shepherd Dogs of different ages and genders. The tapetal fundus was observed to be granular and green-yellow-blue in color, while the nontapetal fundus was observed to be dark colored (dark brown). No statistically significant difference was found between male and female ($P>0.05$) for the existence of these granules in the tapetal region. The optic disc was found to be light pink in color and oval in shape with rounded corners. Although the disc was generally located in the tapetal region, it was also found to be located at the intersection of the tapetal and nontapetal regions. No statistically significant difference was found between the dogs regarding the location of the optical disc with respect to the age or gender of the dogs ($P>0.05$). In conclusion, Kars Shepherd Dogs were found to have a granular, green-yellow-blue tapetum, a dark colored non-tapetum, and an optic disc that was light pink in color and oval in shape with rounded corners; therefore we arrived at the conclusion that the color and variations that we found were breed-specific, as were the other morphological characteristics.

Keywords: Kars Shepherd Dog, Retina, Fundoscopic examination

Kars Çoban Köpeklerinde Normal Retina Varyasyonlarının Fundoskopik Muayene ile Belirlenmesi

Özet

Bu çalışmada, Türkiye'nin kuzeydoğusunda özellikle Kars ve çevresinde yetiştirilen Kars Çoban Köpeklerinde fundoskopik muayene ile retinanın normal varyasyonlarının belirlenmesi amaçlanmıştır. Çalışma, farklı yaş ve cinsiyetteki sağlıklı 50 Kars Çoban Köpeği üzerinde yürütülmüştür. Tapetal fundus yeşil-sarı-mavi renkli ve granüler görünümlü, non tapetal fundus koyu renkli (koyu kahverengi) olarak gözlenmiştir. Tapetal bölgedeki bu granüller açısından cinsiyete göre dağılımda istatistik olarak anlamlı bir fark bulunamamıştır ($P>0.05$). Optik disk hafif köşeli-oval şekilde ve açık pembe renkli, genellikle tapetal bölgede görülmesine rağmen, tapetal bölge ile nontapetal bölge birleşim yerinde de belirlenmiş ve istatistiksel olarak anlamlı bir fark bulunamamıştır ($P>0.05$). Sonuç olarak, Kars Çoban Köpeklerinde tapetumun yeşil-sarı-mavi granüler, nontapetumun ise koyu renkli, optik diskin açık pembe renkli ve hafif köşeli oval şekilli olduğu, dolayısıyla belirlenen renk ve varyasyonların diğer morfolojik özelliklerde olduğu gibi ırka özgü bir özellik niteliğinde değerlendirilebileceği kanısına varılmıştır.

Anahtar sözcükler: Kars Çoban Köpeği, Retina, Fundoskopik muayene



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INTRODUCTION

The most familiar breeds of Turkish Shepherd Dog raised in Turkey are the Kangal, Akbash^{1,2} and Kars Shepherd Dogs^{1,3,4}. There have been many studies carried out on the characteristic features of the Kangal and Akbash Shepherd Dog, but the first scientific information about Kars Shepherd Dogs, which are raised in northeastern Anatolia and particularly Kars district was published by Nelson¹ in 1996 and Kirmızıbayrak³ in 2004. Kars Shepherd Dogs have gray coat of varying length, with lighter colored coat on the tail and legs. They have eyes of varying shades of brown^{1,3,5}.

Various differences in the eye fundus can be observed between dog breeds⁶. Various opinions may be proposed regarding the appearance of the eye fundus in dogs with different colors of coat and iris, particularly in the non-tapetal fundus. However, the relationship between the color of the iris and the coat cannot always be accepted as definite data in determining the color of the nontapetal fundus^{6,7}.

When carrying out a fundus examination, the optical disc, tapetum, non-tapetum and retinal and coroidal blood vessels must be carefully examined⁸⁻¹². Knowing the normal variations of the optic disc, tapetal/nontapetal fundus and the retinal veins is important for determining the hereditary, congenital and acquired pathologies that can develop in the ocular fundus^{7,11-13}. The shape, size and position of the optic disc and the color and shape of the tapetal/nontapetal fundus are usually the same in both eyes. However, there may be small variations in the retinal blood vessels of both eyes^{7,9}.

The purpose of this study was to determined the normal fundoscopic variations of the retina by fundoscopic examination in Kars Shepherd Dogs, which are most often raised in Kars district, and to report these findings to the field of veterinary medicine.

MATERIAL and METHODS

The study material consisted of 100 healthy eyes belonging to 50 Kars Shepherd Dogs selected via field screening among dogs owned by breeders in the province of Kars and the surrounding area. Eight of the dogs were female, 42 were male, and their average age was 4.7 years.

After a vision test, 2-3 drops of mydriatic tropicamide (Tropamid, Bilim, Istanbul) were administered to each eye before ophthalmoscopic examination in order to achieve 20-25 min of mydriasis. Subsequently, the retina was examined via direct and indirect ophthalmoscope and images of the fundus were taken using a retinal camera (Kowa, RC-2, Japan).

The Chi Square method was used to perform statistical evaluation of the data.

RESULTS

Almost all of the Kars Shepherd Dogs that were examined had a tapetal fundus that was granular in appearance and yellow-green-blue or green-yellow-blue in color of these subjects, 14% (7 dogs) had mostly yellow granules around the optic disc, and all of these dogs were found to be less than one year old (Fig 1 and 2). The remaining 86% (43 dogs) were found to have more green and blue granules (Fig 3 and 4), and these dogs were between 1 and 13 years old (Table 1). In all of the dogs in the study, yellow granules were found to be more dense in the periphery of the tapetum.

It was determined that, the color of Tapetum was observed as Yellow-Green-Blue in all dogs less than 1 year old. All of the Kars Shepherd Dogs that were examined with respect to the age or gender, thirty-six of the 42 male dogs, tapetum was yellow-green-blue, and 6 of them it was Green-Yellow-Blue in color. As well as, the color of Tapetum was observed as Yellow-Green-Blue in 7 of them, and Green-Yellow-Blue in 1 of 8 female dogs included in the study. However no statistically significant difference was found between male and female ($P>0.05$).

In all of the eyes that were evaluated, the non-tapetum was found to be a dark brown color that was almost black.

The optic disc was well developed in all dogs, had rounded corners, was nearly oval in shape, and was light pink in color. The optic disc was found to be on the tapetum on 58% of the subjects (29 dogs) and on the intersection of the tapetum and the non-tapetum on 42% of the subjects (21 dogs). The optical disc was not found to be on the non-tapetum on any of the subjects (Table 2). No statistically significant difference was found between the dogs regarding the location of the optical disc with respect to the age or gender of the dogs ($P>0.05$).

The retinal blood vessels were clearly visible and were found to have smooth walls.

Furthermore, no pathological findings were found regarding hyperrefraction in the tapetal fundus of any dogs.

Table 1. Age and sex distribution of the colors of tapetum in Kars Shepherd Dogs

Tablo 1. Kars Çoban Köpeklerinde yaş ve cinsiyet bakımından tapetum renkleri ve dağılımları

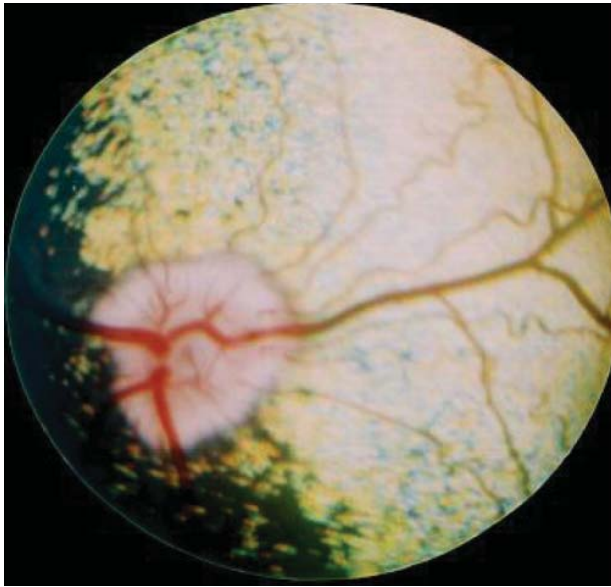
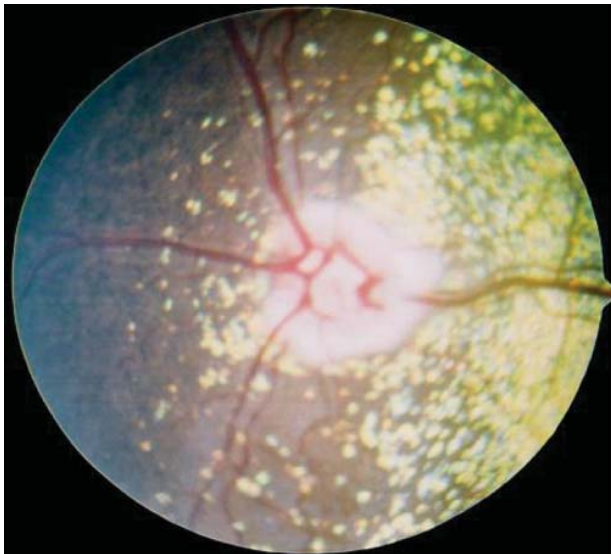
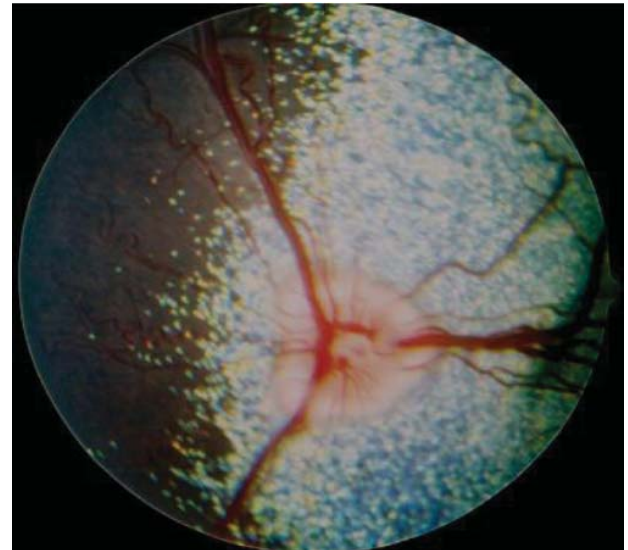
Factor	N	Color of Tapetum		X ²
		Green-Yellow-Blue (n)	Yellow-Green-Blue (n)	
Age (year)				
<1	7	0	7	-
≥1	43	43	0	
Sex				0.18 ^{ns}
Male	42	36	6	
Female	8	7	1	

ns: nonsignificant ($P>0.05$)

Table 2. The optical disc localization according to age and sex in Kars Shepherd Dogs**Tablo 2.** Kars Çoban Köpeklerinde yaş ve cinsiyete göre optik disk lokalizasyonu

Factor	N	Localization of Optic Disc		X ²
		Tapetum (n)	Tapetum-Nontapetum Border (n)	
Age (year)				
<1	7	2	5	2.89 ^{ns}
≥1	43	27	16	
Sex				
Male	42	28	14	0.05 ^{ns}
Female	8	5	3	

ns: nonsignificant (P>0.05)

**Fig 1.** A view of the eye fundus of a 3.5-month-old Kars Shepherd Dogs
Şekil 1. 3.5 aylık Kars Çoban Köpeğinde fundus görünümü**Fig 2.** A view of the eye fundus of a 7-month-old Kars Shepherd Dogs
Şekil 2. 7 aylık Kars Çoban Köpeğinde fundus görünümü**Fig 3.** A view of the eye fundus of an 18-month-old Kars Shepherd Dogs
Şekil 3. 18 aylık Kars Çoban Köpeğinde fundus görünümü**Fig 4.** A view of the eye fundus of a two-year-old Kars Shepherd Dogs
Şekil 4. 2 yaşlı Kars Çoban Köpeğinde fundus görünümü

DISCUSSION

It has been reported that the tapetal fundus in dogs can be green, yellow or orange in color and is usually found to be of mixed color ¹⁴⁻¹⁷. It has been reported that the tapetal fundus in Turkish Shepherd Dogs occurs in various shades of blue, yellow-green or yellow-blue ¹⁴. In a study of 35 Kangal and 35 Akbash dogs, Şaroğlu et al.⁶ reported that the fundus was found to be blue in 65% of Akbash dogs and yellow-blue in 60% of Kangal dogs. In this study, however, all of the subjects that were evaluated were found to have a tapetal fundus that was yellow-green-blue or green-yellow-blue in colour and granular in appearance. The color of Tapetum was determined as Yellow-Green-

Blue and Green-Yellow-Blue less and over than 1 year old dogs, respectively. Therefore, there weren't any statistical analyzed between age groups. This existence of granules in the tapetal region was found to be different between dogs less than one year old and those older than one year. However no statistically significant difference was found between male and female ($P>0.05$). Furthermore, the 7 subjects that were less than one year old were found to have more yellow granules throughout the tapetum, while those dogs over one year old were found to have green-blue granules around the optic disc of the tapetum with more yellow granules in the periphery. The nontapetal fundus was observed to have a dark color (dark brown). Based on these findings, we concluded that the fundus of Kars Shepherd Dogs is different from Kangal and Akbash dogs and more uniform in appearance.

Although it has been reported that the tapetal fundus in Beagles can be yellow-green or orange in color and granular in appearance¹⁷, in this study the tapetum was yellow-green-blue in color and granular in appearance.

Studies that have been carried out^{6,7,14,15} identified the colors of the tapetal region, but none of them revealed any relationship between age and color. In this study, a statistically significant difference was found between the eyes of dogs younger or older than one year old with regard to the density of green, blue and yellow granules.

It has been reported that the optic disc is normally oval, round or has rounded corners, and is usually pink or light pink, while three large retinal blood vessels lead away from the optic nerve head^{14-16,18}. All of the subjects presented in this study were found to have an optic disc that was light pink in color and nearly oval in shape with rounded corners, and they had three large retinal blood vessels leading away from the optic disc. No statistically significant difference was found between the dogs regarding the location of the optical disc with respect to the age or gender of the dogs ($P>0.05$). These findings are consistent with what has been reported in the literature.

In conclusion, it is our opinion that Kars Shepherd Dogs have a granular, green-yellow-blue tapetum, a dark colored non-tapetum (dark brown), and an optic disc that is light pink in color and oval in shape with rounded corners. Furthermore, we conclude that these characteristics are breed-specific, in keeping with other morphological characteristics. Furthermore, we are of the

opinion that research should be carried out to determine the reasons for the relationship between age and the color of the tapetum.

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