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Occurrence of respiratory tract disorders in brachycephalic dogs

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Abstract

The present investigation was carried out at VCC, NTR College of Veterinary Science, Gannavaram from March to November 2023. The overall occurrence of respiratory disorders in brachycephalic dogs was 1.04% (39/3746). Higher occurrence was seen in dogs aged 2-4 years (40%), with a mean body weight of 10-15kg (43.59%), male dogs (65%), Pug (57.5%) breed in May month (28.21%).

Keywords: BOAS, brachycephalic, pug, respiratory

1. Introduction

The assumption that craniofacial confirmation increases the biting forces in dogs had led to the selection of brachycephalic phenotypes, but conversely the appealing looks of these brachycephalic dogs made them as companion animals. (Ekenstedt *et al.*, 2020) ^[12]. Discrete mutation of the popular breeds like Bull dogs and Pugs led to brachycephaly which became an ultimately deteriorating and debilitating syndrome mainly affecting the respiratory tract. Although not all brachycephalic dogs show clinical signs, the incidence and severity of the respiratory disorders has increased which range from mild viral infections to life threatening conditions like Brachycephalic Obstructive Airway Syndrome.

2. Materials and Methods

Six healthy adult dogs brought to the clinic for routine general check-up constituted the healthy control group. A total number of 39 brachycephalic dogs were diagnosed with respiratory disorders by clinical and radiographic findings and confirmed by haematology, electrocardiography, pulse oximetry and echocardiographic examinations.

3. Results

In the present study, the occurrence of respiratory tract disorders in brachycephalic dogs was 1.04% (39/3746) out of the total number of dogs screened and 15.35 percent of the total number of brachycephalic breeds screened (n = 254).

3.1 Age wise occurrence

Age wise occurrence of respiratory disorders in brachycephalic dogs revealed the highest occurrence in dogs in the age group of 2-4 years age group (41.03%) followed by >4 years (33.33%) and <2 years age groups (25.64%).

Table 1: Age wise occurrence of respiratory disorders in brachycephalic dogs (n=39)

S. No.	Age group	No. of brachycephalic dogs affected with respiratory disorders	Percent (%)
1.	<2 years	10	25.64
2.	2-4 years	16	41.03
3.	>4 years	13	33.33
Total		39	100

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3.2 Gender wise occurrence

In the present study, the occurrence of respiratory disorders in brachycephalic dogs was found to be higher in males (65%, 26/39) than in females (35%, 14/39).

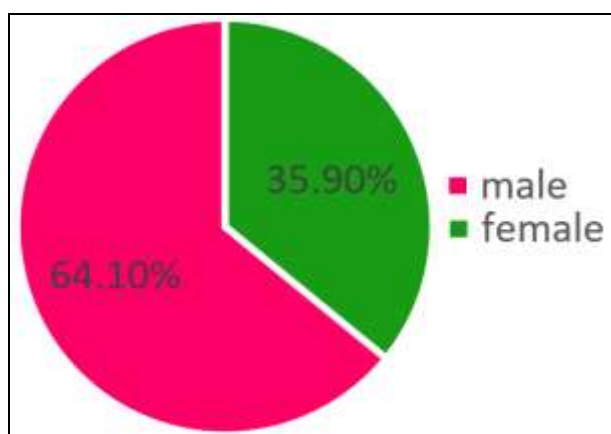


Fig 1: Gender wise occurrence of respiratory disorders in brachycephalic dogs (n=39)

3.3 Breed wise occurrence

The present study revealed higher occurrence of respiratory disorders in Pugs (22/39, 56.42%), when compared to other brachycephalic breeds like Shih tzu, Boxer, Bulldog, Chow Chow, Kavalier King Charles, Pekingese which had incidence rates of 30.78%, 2.56%, 2.56%, 2.56%, 2.56%, and 2.56% respectively.

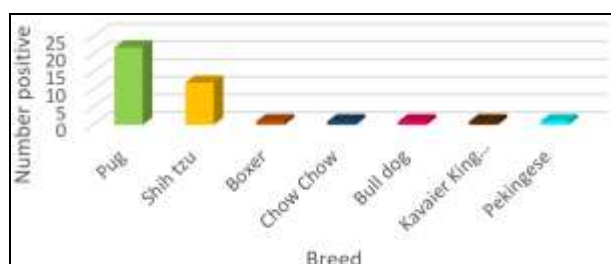


Fig 2: Breed wise occurrence of respiratory disorders in brachycephalic dogs (n=39)

3.4 Month wise occurrence

Month wise analysis of occurrence of respiratory disorders in brachycephalic breeds revealed highest% of cases in May (28.21%, 11/39) followed by June (17.95%, 7/39), April (15.38, 6/39), July (12.82%, 5/39), August (10.26%, 4/39), March and September (5.13%, 2/39) each and with lowest% of cases in October and November (2.56%, 1/39) each.

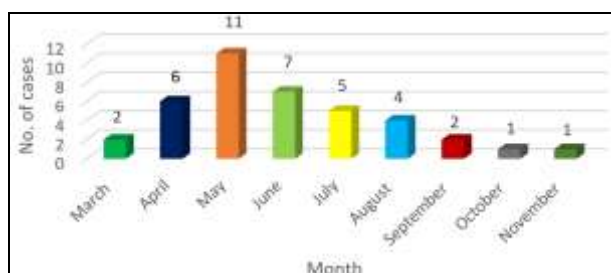


Fig 3: Month wise occurrence of respiratory disorders in brachycephalic dogs (n=39)

3.5 Occurrence in relation to bodyweight

The present study revealed highest incidence of respiratory disorders in brachycephalic breeds i.e., in 10-15 kg (17/39,

43.59%) body weight dogs followed by 5-10 kg body weight (33.33%), >15 kg body weight (6/39, 15.39%) and <5 kg body weight (3/39, 7.69%) dogs.

Table 2: Occurrence of respiratory disorders in brachycephalic dogs in relation to body weight (n=39)

S. No.	Weight	Number	Percentage (%)
1.	<5 kg	3	7.69
2.	5-10 kg	13	33.33
3.	10-15 kg	17	43.59
4.	>15 kg	6	15.39
	Total	39	100

4. Discussion

In the present study, out of 3476 dogs that were screened during the period from March 2023 to November 2023, out of which 254 were brachycephalic breeds and among which 39 dogs were diagnosed to be affected with respiratory tract disorders making it an overall occurrence of 15.35% (39/254). The incidence rate was in accordance with Sainoi *et al.* (2020) who stated the incidence rate of respiratory disorders in brachycephalic dogs varied from less than 10% and up to 50%.

Age wise occurrence of respiratory disorders in the present study was highest in dogs with age group of 2-4 years (16/39, 41.03%) and these findings were in accordance with Monnet (2003), Pink *et al.* (2006) [33], Fossum *et al.* (2007) [18], Findji and Drupe (2008) [17], Fasanella *et al.* (2010) [15], Trappier *et al.* (2011) [35], White (2012) [36], Meola *et al.* (2013) [27], Crosse *et al.* (2015) [8], Canola *et al.* (2018) [5], Ekenstedt *et al.* (2020) [12], Igna *et al.* (2021) [23] and Nakazawa *et al.* (2023) [28].

Everted tonsils are likely to occur which caused continuous airway strain in dogs above one year of age (Fasanella *et al.*, 2010) [15]. Clinical signs of brachycephalic syndrome were common in young to middle aged dogs which attained sexual maturity. Higher grades of BOAS patients had more age when compared to lower grade BOAS patients which might be due to progressive nature of disease (Erjavec and Steve, 2023) [14]. In contrast, Packer *et al.* (2015) [31] recorded higher incidence of respiratory disorders in BOAS at 12 months of age, Crane *et al.* (2017) [7] reported the age group as 5 to 11 years (median age of 9 years) and Zgank *et al.* (2021) [37] who reported the incidence in 22.14±12.41 months.

The occurrence of respiratory disorders in BOAS was higher in males (64.10%, 25/39) than females (35.90%, 14/39) in the present study which was in accordance with Pink *et al.* (2006) [33], Huck *et al.* (2008) [22], Grand and Bureau (2011) [19], Trappier *et al.* (2011) [35], Meola *et al.* (2013) [27], Oechtering (2016) [29], Zgank *et al.* (2021) [37], Bagardi *et al.* (2023) [1] and Dimopoulou *et al.* (2023) which might be due to the presence of thicker soft palate in males when compared to females (Grand and Bureau 2011) [19]. In contrast, Liu *et al.* (2017) [25] reported higher incidence of brachycephalic syndrome in females than males as male dogs are used as stud dogs at early age and not bred until they become older. However, Hedlund *et al.* (2007) opined that males and females are equally affected with brachycephalic syndrome.

The present study revealed relatively higher occurrence of respiratory disorders associated with BOAS in Pugs (22/39, 56.42%) followed by Shih tzu (30.78%) when compared to other breeds of brachycephalic dogs like Boxer (2.56%), Bulldog (2.56%), Chow Chow (2.56%), Kavalier King Charles (2.56%), Pekingese (2.56%) which had lower occurrence. This highest incidence in pugs was in agreement with Lorenzi *et al.* (2009) [10], Bartels *et al.* (2015) [2], O'Neil

et al. (2015) [30], Fawcett (2019) and Bonnett *et al.* (2023) [4]. The highest incidence in Pugs was due to increasing popularity of the Pug breed (Packer *et al.*, 2012 and Costa *et al.*, 2021) [32, 6]. Celebrity endorsement and product advertising were the social effects which led to the excessive and suboptimal breeding thus resulting in increased problems in Pugs related to brachycephalic airway syndrome (O'Neil *et al.*, 2015) [30]. In contrary, Findji and Drupe (2008) [17], Oechtering (2016) [29] and Nakazawa *et al.* (2023) [28] stated highest incidence in French bulldogs (32/45), (77/158, 48.7%) and (39/160, 34.2%) respectively where Fasanella *et al.* (2010) [15] and Bernaerts *et al.* (2010) [3] stated higher incidence in English bulldog.

In the current study, comparatively higher percentage of respiratory disorders in brachycephalic dogs was recorded in the month of May followed by June, April, July and August with least cases in October and November. Higher occurrence in these months might be due to peak summer in the months of May and June in Andhra Pradesh thus exerting stress on animals. This is in accordance with Holt (1998) [21], Davis *et al.* (2017) [9] and Hall *et al.* (2021) [20]. Hot environment induced high levels of stress or excitement in brachycephalic dogs (Cambridge BOAS group, 2023) [13].

In the current study respiratory disorders associated with brachycephalic syndrome were more in the dogs with weight of 10 to 15 kg (4.59%) followed by dogs with body weight of 5- 10 kg (33.33%), >15 kg (15.39%) and <5kg (7.69%). This was in accordance with Trappler and Moore (2011) [35], Packer *et al.* (2015) [31], Liu *et al.* (2016) [24] and Chandler (2016) who also stated that increased body weight enhances the severity of respiratory signs associated with brachycephalic syndrome. Obesity affected the respiratory system in dogs which was demonstrated by whole body plethysmography which showed an increase in tidal volume in case of obese dogs. Obesity narrowed pharyngeal airway and increased upper airway collapsibility (Magalang *et al.*, 2000) [26].

5. Conclusion

Out of the 3746 dogs screened 39 dogs were found to be suffering with respiratory disorders which showed the incidence percentage as 1.04%. Out of the 254 brachycephalic dogs screened 39 dogs had respiratory disorders which showed 15.35% among the brachycephalic dogs. Age wise occurrence of brachycephalic obstructive airway syndrome was found to be 41.03 percent at the age group of 2-4 years, 33.33 percent at the age group above 4 years and 25.64 percent at age group less than 2 years of age. Incidence in relation to body weight revealed higher incidence in dogs with body weight. The gender wise distribution of brachycephalic dogs with respiratory disorders revealed male dogs (64.10%) were more affected when compared to females (35.90%). The breed wise occurrence of brachycephalic obstructive airway syndrome is found to be higher in Pug (56.42%), Shih tzu (30.78%), Boxer (2.56%), bulldog (2.56%), Chow Chow (2.56%), Cavalier king Charles spaniel (2.56%) and Pekingese (2.56%). Occurrence in relation to the month of occurrence highest incidence was seen in the month of May (28.21%), followed by June (17.98%), April (15.38%), July (12.82%), August (10.26%), March and September (5.13%) each and October and November (2.56%) each. Occurrence in relation to body weight was highest in brachycephalic dogs with 10-15 kg body weight (43.59%)

when compared to 5-10 kg (33.33%), >15 kg (15.39%) and <5 kg (7.69%) body weight.

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