

Gross Anatomical Study of Nasal Cavity in Turkey (*Meleagris gallopavo*)

P. Dharani*, A. Kumaravel

ABSTRACT

The present study was aimed to document the gross anatomical features of nasal cavity in Turkey. Six heads from healthy birds were utilized for this study. The nasal cavity started with elliptical external nares and divided completely into two equal halves by a cartilaginous nasal septum. Each half of the cavity was triangular/cone shaped which lodged rostral, middle and caudal nasal conchae. The middle nasal concha was largest and situated in an oblique manner. The caudal concha was smallest and bulla-like. Five nasal meatuses were noticed in the nasal cavity of Turkey.

Key words: Conchae, Gross morphology, Nasal cavity, Turkey.

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INTRODUCTION

Birds are endotherms with very unique respiratory system. The nasal cavity is occupied by nasal conchae or turbinates. The turbinates of birds are complex and highly convoluted, often scrolled structures, lined with moist mucociliated epithelium. Conchae are the primary respiratory structures used for modifying and conditioning respired air during routine ventilation in birds. It increases the surface area of the nasal mucosa, which helps in olfaction and thermoregulation (Geist, 2000; Lovegrove, 2017) and also acts as first line of defense (Harem *et al.*, 2018).

The nasal cavity is well documented by notable scientists in several birds namely, Japanese quails (Cevik-Demirkan *et al.*, 2007), hooded crow (Hassan, 2012), Ostrich (Ali, 2015), laughing dove (Farouk *et al.*, 2017), quail, duck and geese (Madkour, 2019), Nandanam chicken (Dharani *et al.*, 2020) and Rock dove (Dauod *et al.*, 2021). Hence, the present study was undertaken to focus on the gross anatomical features of the nasal cavity of the turkey and compare the results with the previously published data of the other avian species. But the description about nasal cavity in Turkey was found to be in need of more details.

MATERIALS AND METHODS

The present study was conducted with the materials collected from apparently healthy Turkey of almost same age group in nearest Turkey farm at Namakkal district. Six heads were collected irrespective of sex and fixed in 10% Neutral Buffered Formalin. The heads were sectioned in a sagittal manner and also sectioned transversally at the level of the middle nasal concha. The gross anatomical features of the nasal cavity were documented and photographed.

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RESULTS AND DISCUSSION

The nasal cavity was noticed rostrally from elliptical nares without operculum and located at the base of upper beak in Turkey (Fig. 1), whereas the nostrils were circular and covered by a tuft of feathers in hooded crow (Hassan, 2012). The nasal cavity of Turkey was divided completely by an entirely cartilaginous nasal septum into two equal halves (Fig.2). Similar observations were recorded in Japanese quail (Cevik-Demirkan *et al.*, 2007), Chicken (Kang *et al.*, 2013; Dharani *et al.*, 2020) and Laughing dove and Japanese quail (Madkour, 2019). In contrast, the nasal septum was membrano-cartilaginous in rostral part and bony in caudal part in the Ostrich (Ali, 2015) and incomplete cartilaginous septum in rock dove (Dauod *et al.*, 2021) and Eurasian common moorhen (Hanafy, 2021). Perforation in the nasal septum allows the passage of water outside the nasal cavity during diving in aquatic birds, viz., Muscovy ducks and Egyptian geese (Madkour, 2019). The perforation in the nasal septum was not observed in the present study. The complete division of nasal cavity helps in regulation of the air quantity which passes through the nasal

concha to the nasopharynx (Casteleyn *et al.*, 2018). In sagittal section, each half of the cavity was triangular/cone shaped and gradually increased in its width caudally. The conchae were bilaterally paired cartilaginous structures projecting into the nasal cavity from lateral wall. There were three distinct tightly packed nasal conchae in Turkey namely, rostral (anterior), middle and caudal (posterior) nasal conchae (Fig. 3). The observations were similar to the nasal cavity in majority of avian species. The number varied in some birds, *viz.*, lack of caudal concha in Japanese jungle crow (Yokosuka *et al.*, 2009), the atrial (fourth) concha was partially coiled inside the rostral concha in turkey (Bourke and Witmer, 2016), absence of middle concha in dove (Madkour, 2019) and in Song sparrow (Danner *et al.*, 2016).

In the present study, the rostral concha was second largest, slightly involuted, cone shaped and the cranial edge was protruded through the nostril (Fig. 1). In contrast, the rostral concha was the largest in laughing dove (Farouk *et al.*, 2017). In the present study, the middle nasal concha was the largest, elongated, scroll-like and situated in an oblique manner between rostral and caudal conchae. In transverse section, it was coiled approximately 1.5 times at maximum ventero-laterally (Fig. 2 & 4). The caudal concha was the smallest and bulla-like located above the dorsal part of middle concha. In contrast, the caudal concha was the largest one in hooded crow (Hassan, 2012)



Fig. 1: The external nare (arrow) and protrusion of rostral concha (Head of arrow) in turkey

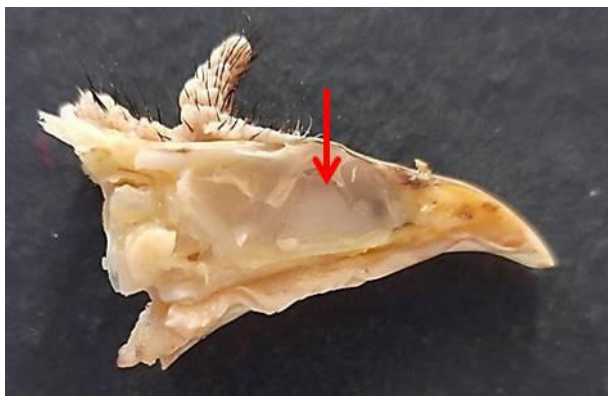


Fig. 2: Completely cartilaginous nasal septum (arrow) of turkey

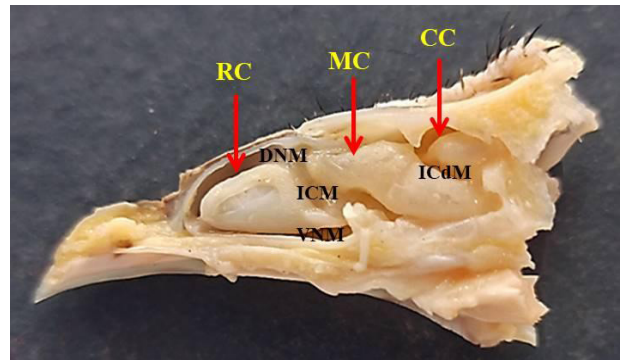


Fig. 3: Location of rostral (RC), middle (MC) and caudal (CC) conchae and dorsal nasal meatus (DNM), ventral nasal meatus (VNM), Intermedio-cranial meatus (ICM) and Intermedio-caudo nasal meatus (ICdM) in the nasal cavity of turkey

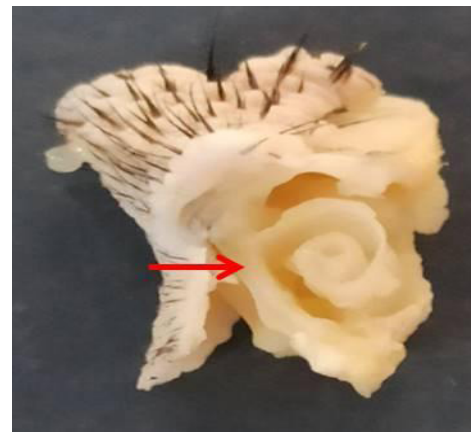


Fig. 4: The scroll-like structure of middle conchae in transverse section. Arrow- Lateral wall of nasal cavity of turkey

The nasal meatuses were observed in the present study (Fig. 3). The common nasal meatus (CNM) was the largest air passage situated between the conchae and nasal septum. The dorsal nasal meatus (DNM) was seen between the roof of the nasal cavity and the conchae. The intermedio-cranial meatus (ICM) was situated between the rostral and middle conchae, while the intermedio-caudal meatus (ICdM) was present between middle and caudal conchae. The ventral nasal meatus (VNM) was seen between the rostral and middle conchae dorsally and the floor of the nasal cavity ventrally as reported by Cevik-Demirkan *et al.* (2007). In toto, the conchal anatomy of Turkey was found to be different in many aspects among the birds of same genus.

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