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Comparison of Morphological and Morphometric Traits of Pakistani High Flyer Pigeons to Mughal Era Pigeons

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Abstract. This study investigates the morphological and morphometric characteristics of Pakistani high-flyer pigeons, comparing them to pigeons from the Mughal era. The focus is on pigeons from Sheikhupura, Pakistan, a region with a unique climate characterized by temperatures ranging from 40-45 °C, making it an ideal location for studying high-flyer pigeons. Five local pigeon breeds were analyzed: the Golden pigeon, Qalsire pigeon, Lakhay pigeon, Ferozpuri pigeon and Sialkoti pigeon. The study emphasized important morphological characteristics such as eye and body color, wing and tail feathers, along with morphometric parameters including body weight and wing length. The analysis revealed that the Golden, Qalsire, Lakhay, Ferozpuri and Sialkoti pigeons exhibit distinct morphological and morphometric traits. Each breed showed unique features, suggesting potential genetic factors influencing these traits. The distinctiveness of these pigeon breeds in terms of their morphological and morphometric characteristics suggests the need for future research at the molecular level. Such studies could provide a deeper understanding of avian biology and inform conservation strategies for these unique pigeon breeds.

Keywords: high-flyer pigeons, morphological characters, morphometric characteristics, mughal era pigeons, Sheikhupura, Punjab, Pakistan

Introduction

Birds are a valuable livestock resource, contributing significantly to human nutrition through the production of meat and eggs. They also serve as important laboratory animals for various studies. Understanding birds' internal organs' physiological, anatomical, topographical and histological features is crucial for comparing healthy tissues with those affected by bacterial, viral, or parasitic infections. This knowledge aids in diagnosing and managing diseases in birds (Alabdallah *et al*., 2024). Pigeons belong to the family Columbideae and order Columbiformes. They are very attractive creatures. Pigeons are found throughout the world except for polar region. It is reported that from past to today more than 800 different species of pigeons are found (Jerolmack, 2009l; Vogel *et al*., 1994). They show variations in their appearance from generation to generation. They show variations in morphology and behavior (Domyan and Shapiro, 2017; Helms and Brugmann, 2007). It is reported that they are divided into different groups regarding to their flight and acrobatic movements (Manceau *et al*., 2010; Baptista *et al*., 2009). They show difference in appearance due to plumage colour, beak shape and size, eye colour or pattern, wing span and wing length. There are many different breeds of pigeons in Pakistan. Pakistani high-flyer is one of the most widely bred breeds in Pakistan for their unique characteristics. Ferozpuri, Sialkoti and Golden are some types of high-flyer while Qalsire and lakhay are the types of tippler (A domesticated breed of pigeon called a tippler is renowned for its prodigious endurance in flight. These pigeons can hover in the air for several hours and are trained to fly in circles or carry out specific aerial tricks. Their ability to roll and tip while in flight is referred to as "tippling"). Tippler also comes in the category of high-flyer (Contributors to Wikipedia projects, 2022) (https://www.tipplers.ca/various-articles/english-flying-tipplers/the-english-flying-tippler/). High-flyers are the descendants of Rock dove. They can endure a high temperature range between 40-50 °C. They are well known for their flying speed at a height of nearly unseen altitude. They can fly till about 12-14 h without stopping.

The Mughal era was one of the largest empire from 1526-1857. Babur was its founder. They had ruled over India about 1000 of years. They were known for their military, arts and architecture and religious tolerance.

In Mughal era the purpose to keep pigeons are their different characteristics such as flight, mailing ability, nice appearance, sweet sound, rolling ability in short for amusement. They were reared for meat also.

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Mughal era pigeon was also studied regarding to their morphological and morphometric characteristics. Lahore pigeon also known as Sherazi is still present in Pakistan, Bangladesh and India ("Lahore Pigeon-Pigeon keeper," n.d.).

The morphological characters and morphometric of best breed of high flyer is also compared with that of the Lahore pigeon of Mughal era (ME).

The main objective of the present study is to determine the different morphological and morphometric characteristics of high-flyer pigeons found in Sheikhupura, Pakistan. Additionally, the study aims to compare the morphological and morphometric characteristics of these contemporary pigeon breeds with those of the pigeons from the Mughal era (ME). Another key objective is to identify the unique characteristics of high-flyer pigeons and compare these distinctive traits with those of the Mughal era pigeons.

Materials and Methods

Study area. The study was conducted in Sheikhupura, Punjab, Pakistan.

Morphological characters. Various morphological characters were observed, including:

- Head type (fatty or non-fatty)
- Eye colour
- Primary wing feathers
- Tail feathers
- Body colour

Morphometric characteristics. Different morphometric characteristics were measured, such as:

- Body weight
- Body length
- Head length and width
- Beak length and depth
- Tail length
- Chest length, width and depth
- Primary wing feathers

Tools and techniques:

- *Measuring tape*: Used to measure the length of different body parts.
- *Camera*: Utilized to take pictures during measurements and observations.
- *Weighing Machine*: Employed to measure body weight.

All observations and measurements were systematically recorded to ensure accuracy and consistency in data collection.

Result and Discussion

According to the present study, it is concluded that pigeons with a short beak, wide forehead and strong, well-muscled body are considered the best representatives of Pakistani high-flyers. The head type, eye colour and body colour of high-flyers were observed and are detailed in Table 1. The body weight, body length, wing length, wingspan, head length, head width, beak length, chest length, width, depth and tail length of Pakistani high-flyers are provided in Table 2. The following results are derived from the eye observations:

In Fig. 1 point A, B, C, D and E show measurements of wing length, head size, tail length, body length and representative respectively.

Table 1. Morphological characteristics of Pakistani high flyers, eye colour, body colour, number of wings, tail feathers, presence or absence of trotter

Characters	Ferozpuri	Golden	Sialkoti	Qalsire	Lakhay
Eye colour	Black	Black	Black	Black	Black
Body colour	Blackish gray colour from head to neck, gray and black tail, gray spots on white bod	Black head and tail, black spots on wings, trunk is white	White	Blackish gray colour from head to neck, gray and black tail, gray spots on white body	White with brown spots on head and neck
Primary wing feathers	10	11	14	12	11
Tail feathers	11	11	12	12	11
Presence or absence of trotter	Absent	Absent	Absent	Absent	Absent

In Fig. 2 point A, B, C, D and E show measurements of head size, body length, tail length, beak size and representative respectively.

In Fig. 3 point A, B, C, D and E show measurements of wing length, head size, tail length, beak size and representative respectively.

In Fig. 4 point A, B, C, D and E show measurements of wing length, body length, tail length, beak size and representative respectively.

In Fig. 5 point A, B, C, D and E show measurements of wing length, body length, head size, beak size and representative respectively.



Fig. 1. Golden pigeon.



Fig. 2. Qalsire pigeon.

Table 2. Morphometric characteristics of Pakistani high flyers

Morphometric characteristics	Ferozpuri	Golden	Sialkoti	Qalsire	Lakhay
Body weight g	200 g	300 g	250 g	300 g	300 g
Body length cm	25 cm	28 cm	20 cm	28 cm	28 cm
Wing length cm	10 cm	11 cm	10 cm	11 cm	12 cm
Wingspan cm	56 cm	64 cm	55.8 cm	63.5 cm	64 cm
Head length cm	3.81 cm	5 cm	2.5 cm	5 cm	6.35 cm
Head width cm	2.5 cm	2.5 cm	2.5 cm	2.5 cm	3.17 cm
Beak length cm	1.27 cm	2.54 cm	1.36 cm	2.54 cm	2.54 cm
Chest length cm	10.16 cm	7.62 cm	10. 16 cm	7.62 cm	12. 7 cm
Chest width cm	7.62 cm	7.62 cm	8.89 cm	5.08 cm	7.62 cm
Chest depth cm	10.16 cm	12.7 cm	10.16 cm	10.16 cm	15.24 cm
Tail length cm	13 cm	13 cm	12 cm	13 cm	14.7 cm

This study represents the first reported work comparing the morphological and morphometrical characteristics of Pakistani high flyer pigeons and Mughal era pigeons. The research was conducted on five representatives of each breed and the means of various characteristics were calculated and analyzed.

The body weight of the high flyer pigeon observed in this study is 200 g, whereas it is reported that pigeons can weigh more than 300 g (Parés-Casanova, 2010). The observed body length is 25 cm, while reported values range from 15.72-16.63 cm (Fajemilehin, 2017). The chest width of high flyers is 10.16 cm, compared



Fig. 3. Lakhay pigeon.



Fig. 4. Ferozpuri pigeon.

Table 3. Morphological characters of Mughal Era Pigeons

Characters	Tumbler	Lotan	Carrier	Fantail	Kokah	Lahore	Jacobin	Cropper
Eye colour	Pearl, yellow	Blue	Red	White, black, blue, red, yellow, silver	Black	Black, dark blue, pearl, red	Pink	Orange, white
Body colour	Blue, black, brown, white	Blue, ash red, brown, black, white	Black, white, brownish gray	Orange, white, dark brown	Red, gray, black, white, blue	Red, blue, brown, black	White, black, blue, red, yellow, silver	Black, white, dun, cream, red, yellow, silver, mealy, blue
Presence/ absence of trotter	Present	Absent	Absent	Present	Absent	2-3 feathers	Absent	Absent

to a reported width of 15.8-16 cm. The observed wing span is 56 cm, which is closely related to the reported span of 60.98-62.24 cm (Fajemilehin, 2017). The observed wing length is 10 cm, whereas the reported length is 26.23-26.45 cm. The observed head size ranges from 2.5-3.81 cm, compared to the reported size of 5.9-6.4 cm. The observed beak length is 1.27 cm, whereas the reported length is 2.49-2.76 cm (Bhowmik *et al*., 2014) (Pigeon, 2014). The observed tail length is 13 cm, compared to the reported length of 11.01-11.15 cm (Bond, 1919).

The eye colour of the observed pigeons is black, while it is reported that pigeon eye colours can include yellow-orange, white pearl and black (Oliphant *et al*., 1992; Oliphant, 1987; Bond, 1919). The body colour of the observed breed is predominantly black head and tail, gray spots on the trunk with a white base, which aligns with reported observations (Haase *et al*., 1992). The observed number of wings is 10, while the reported number is 11 (Pigeon: Exoskeleton, Quill Feather, n.d.). The observed number of tail feathers is 11, whereas the reported number is 12 (Pigeon: Exoskeleton, Quill Feather, n.d.). Trotters are absent in both cases, which is consistent with existing studies (Pigeon: Exoskeleton, Quill Feather, n.d.).

The Ferozpuri breed exhibits a unique characteristic of a short beak, which is a morphometric trait contributing to their high-flying ability.

Comparative analysis with mughal era pigeons. Pigeons have been a favourite bird not only for common people but also for rulers. In this study, the unique breed compared of Sheikhupura with Mughal era pigeons.

Modern-day pigeons are bred for racing, meat (rich in minerals) and pollination (Fantails, n.d.).

In present day pigeons are reared for earning money by racing, for meat as their meat is rich in minerals



Fig. 5. Sialkoti pigeon.

Table 4. Morphometric characteristics of Mughal Era pigeons

Characteristics	Tumbler	Lotan	Carrier	Fantail	Kokah	Lahore	Jacobin	Cropper
Body weight g	314.75-328.49 g	300 g	500 g	369 g	257.32 g	480-550 g	350 g	700-750 g
Body length cm	33.83-34.14 cm	32-36 cm	43.18-45.72 cm	15-18 cm	38 cm	29.21 cm	35.56 cm	60.96 cm
Head size	Round	fatty & wide	Fatty and round	Small	Round	fatty & round	Hidden behind hood	fatty
Beak pattern	Short & medium	Round & broad	Long	Curved	Short curvy	Short & broad	Straight and slender	Long & strong
Tail length cm	13.55-14.06 cm	30 cm	17.52-21.08 cm	30.48 cm	2.5-5 cm	30-40 cm	5-7.5 cm	7.5-10 cm

(Pigeonask.com). They are also important for pollination ("Fantails,"n.d.).

A comparison between morphological characters of Mughal Era Lahore (sherazi) pigeon which is still found in Pakistan, Bangladesh and India and present Pakistani Ferozpuri pigeon the one of the best breed of Pakistani high flyers is given in Table 7.

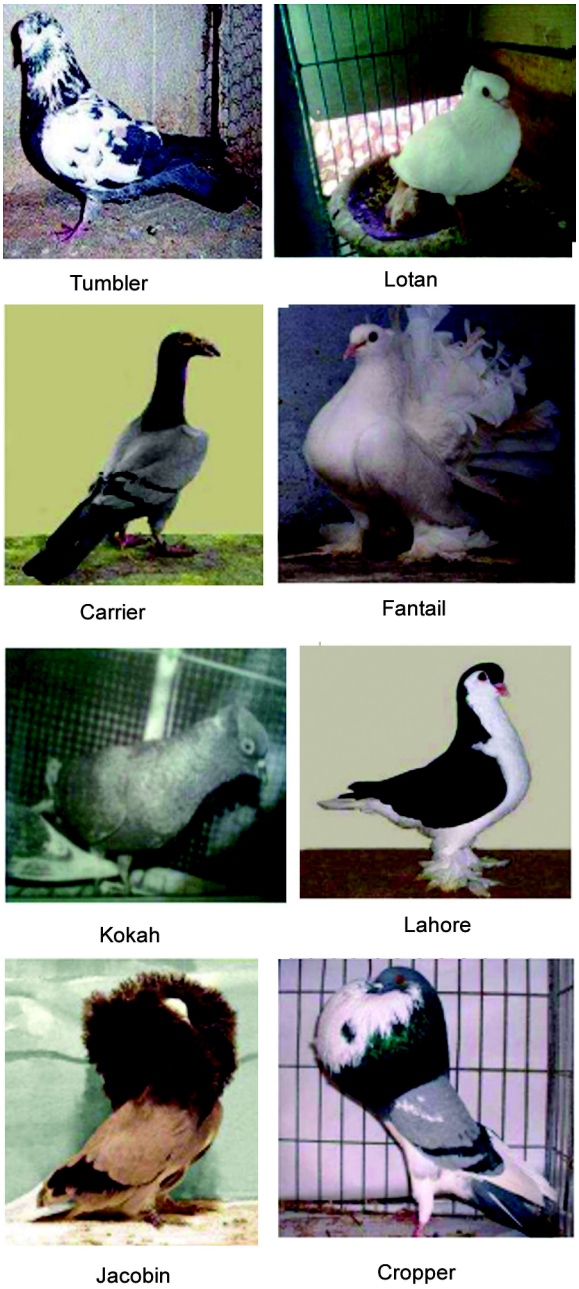


Fig. 6. Mughal era pigeons taken from (Kabir *et al*., 2014).

A comparison between morphometric characteristics of Mughal Era Lahore (sherazi) pigeon and present Pakistani Ferozpuri pigeon is given in Table 8.

Table 5. Comparison of morphometric characteristics between past vs present pigeons

Characters	Mughal era past pigeons	Pakistani high-flyer present pigeon
Body weight	445.41 g	200 g
Body length	38.33 cm	25 cm
Head size	Large	small
Beak size	Short, medium, long	Short and stout
Tail size	Short, medium, long	small

Table 6. Comparison of morphological characters between past vs today's pigeons

Morphological characters	Mughal era pigeons	Pakistani high-flyer present pigeons
Eye colour	Black, white, gray, red	Black
Body colour	Black, white, gray	Black, white, gray
Presence/absence of trotter	Absent	Absent

Table 7. A comparison between morphometric characteristics of Lahore (sherazi) pigeon and ferozpuri

Morphometric characteristics	Lahore (sherazi) pigeon	Ferozpuri pigeon
Eye colour	Black, dark blue, pearl red	Black
Body colour	Red, blue, brown, black	Black head, white trunk with gray spots, black tail
Presence or absence of trotter	2-3 feathers	Absent

Table 8. A comparison between morphological characters of Lahore (sherazi) pigeon and ferozpuri

Morphological characters	Ferozpuri pigeon	Lahore (Sherazi) pigeon
Body weight g	200 g	480-550 g
Body length cm	25 cm	29.21 cm
Head size	Non Fatty	Fatty and round
Beak size	Short	Short and broad
Wing length cm	10 cm	11-15 cm
Wing span cm	56 cm	61-66 cm
Tail size	13 cm	13 cm

According to local knowledge the head and tail size mention here as small and large, as the normal head size vary from 5-7.5 cm and tail from 20-35 cm, so any size below or up from it suggest a small or large head and tail respectively.

Each and every morphological characters and morphometric characteristics of past pigeons discussed here are proved by different references, local knowledge also contribute in it.

Conclusion

This study offers a detailed comparison of the morphological and morphometric traits of Pakistani high-flyer pigeons and Mughal era pigeons, focusing on breeds from Sheikhupura, Pakistan. Key findings indicate that pigeons with short beaks, wide foreheads and strong, well-muscled bodies are the best representatives of Pakistani high-flyers. Significant differences between contemporary high-flyers and Mughal era pigeons were observed, highlighting potential genetic factors. The Ferozpuri pigeon, with its distinctive short beak, exemplifies these differences. These findings underscore the influence of Sheikhupura's climate on pigeon traits and suggest the need for future molecular research to deepen our understanding of avian biology and inform conservation efforts.

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Conflict of Interest. The authors declare that they have no conflict of interest.

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