

Study on Dongkyung-i Dog Characterized as Anury and Brachyury

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Abstract : Until now, there are no scientific studies for Dongkyung-i (DKI) dog, which is recently called as Deng-Kyun. This study is aimed to investigate the characteristics of DKI. According to visiting studies, DKI is an active, live and muscular dog. The dog is willing to announce the approach of strangers friendly. As the results of morphological studies, DKI is medium sized and the average weight is 22.6 kg. Its coat has mainly yellowish brown color and short hair. Morphologically, the dog showed vestigial tail and muscular and sturdy pelvic limbs. As the results of radiological studies, DKI is characterized as the absence of coccygeal vertebrae or the coccygeal agenesis. We concluded that DKI may be a Korean native canine breed characterized as short or non-tail dog. Also, we suggested that this characteristic dog is valuable to develop as a Korean native breed.

Key words : Dongkyung-i, Deng-Kyun, anury, brachyury, dog.

Congenital taillessness (anury) and tail-shortness (brachyury) occur in low frequency among various breeds such as Pembroke Welsh Corgis, Schipperke and Bulldog (3). The tail of dog is normally composed with coccygeal vertebrae, versatile muscles, blood vessels and caudal nerves (6). The coccyx and versatile muscles are direct continuations of the caudal trunk and play an important role in locomotory activities and behavioral communication (6). If caudal hypoplasia or agenesis occurs, the dogs may suffer with functional disturbance of locomotion and defecation (1). The reported short tailed cases were characterized by vestigial atypical coccyx trace (2,3). Anal sphincter function in anury dogs is reported usually abnormal because of the specific muscles are responsible for normal defecation, which resulted in fecal staining of the hind limbs (2). Also, until now, congenital complete anury, which coccyx was absolutely disappeared, has not been reported in dogs. In this study, we are aimed to study the characteristics of Dongkyung-i (DKI), a Korean native dog with complete anury or brachyury.

For this study, 23 DKI dogs were randomly selected from DKI kennels in Korea. The dogs were submitted to physical, hematological and radiological examinations for the body conformation and condition, and also investigated historically by bibliographic studies using Korean ancient books like as Table 1. Their characteristic appearance was complete taillessness or brachyury (Fig 1). All of them revealed the inheriting phenotype of congenital taillessness or brachyury without abnormal physical condition. The results of morphological study

were summarized in Table 2. The average body weight was 22.6 ± 3.21 kg and tail length was 1.24 ± 1.71 cm. In this study, the taillessness frequency was 48% and short-tail frequency was 52%. The dogs showed healthy and sturdy appearance. They revealed mainly yellowish brown coat and short hair (Fig 2). Ears were the shape of triangle and eyes were brown diamond shape. The physical and hematological examinations of them revealed normal values. Their defecation, urination and locomotion were also normal. As the results of radiography, they were characterized as coccygeal agenesis and had no coccyx (Fig 3, 4). On lateral and ventrodorsal projections of radiograph, they were revealed by the disappearance of the coccyx and the atypical sacrum (Fig 3, 4). The pelvis showed normal appearance (Fig 3, 4). Bibliographically, DKI



Fig 1. Photograph of anury. The Dongkyung-i revealed taillessness.

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Table 1. Historical documentary investigation of Dongkyung-i

Documents	Publish	Editor	Contents
1 東京雜記 (Dongkyung-jabki)	AD 1669	閔周冕 (Min, Ju-Myun)	卷1 風俗 女子北 羅時以國都北方虛缺 女子結於後 因名北 至今猶然 狗之短尾者 世謂之東京狗 亦以北方之虛故也 (Vol. 1. Customs, 'Bukgyae of women' Women had Bukgyae, knot of hair on the back of the head, in Shilla kingdom, because people felt emptiness at the north of the capital city, Kyungju, which another name was Dongkyung. They called a short tailed native dog as a Dongkyung-i, which is originated from their feeling emptiness at the north area.)
2 星湖僊說 (Sungho-sasul)	AD 1740	李瀾 (Yi, Yik)	羅之都北方虛缺故女子結於後 因名北 狗之短尾者 世謂之東京狗 此皆新羅之俗也 (Women had Bukgyae, knot of hair on the back of the head, in Shilla kingdom, because people felt emptiness at the north of the capital city. They called a short tailed native dog as a Dongkyung-i, which is originated from Shilla customs.)
3 增補文獻備考 (Jeungbo-munheon-bigo)	AD 1770	洪鳳漢 (Hong, Bong-Han)	地志云 東京地形 有頭無尾 犬之生於此地者 多無尾 故俗諺因以無尾犬 謂之無尾犬 (The geographical features of Dongkyung by Jiji, an ancient geography book, was described that the city was shown as head existence but tail absence. The dogs, born from the city, were almost tailless. Therefore they called the dogs as Mumigyun which mean tailless dog.)
4 古今釋林 (Kokeum-Seokrim)	AD 1789	李義鳳 (Yi, Yui-Bong)	東京志曰 新羅時 以國都北方虛缺 女子結於後 因名北 至今猶然 狗之短尾者 世謂之東京狗 亦以北方之虛故也 (The Dongkyung-gi, an ancient book, says that women had Bukgyae, knot of hair on the back of the head, in Shilla kingdom, because people felt emptiness at the north of the capital city, Kyungju, which another name was Dongkyung. They called a short tailed native dog as a Dongkyung-i, which is originated from their feeling emptiness at the north area.)
5 洛下生集 (Nakha-saengjib)	AD 1800	李學逵 (Yi, Hak-Kyu)	嶺南樂府 東京狗 (Yeongnam-akbu, a Chinese poetry book written by Hak-kyu Yi, included the word of Dongkyung-i.)
6 五洲衍文長箋散稿 (Ojuyeonmun-jan-gjeon-sango)	AD 1850	李奎景 (Yi, Kyu-Kyeong)	獐子狗。即短尾狗也。按今嶺南慶州府犬皆短尾。故名東京狗。鹿尾狗。即短尾狗也。 (Jangjagu or Nokmigu, another old name Dongkyung-i, was short tailed dog and found frequently from Kyungju province in the southeastern part of Korea.)

**Fig 2.** Photograph of Dongkyung-i. The dog has yellowish brown coat and short hair.

dog has been originated from Shilla kingdom, which was confirmed by Korean ancient books (Table 1). The name of DKI

is originated from Dongkyung, another name of Gyeongju, the capital of ancient Shilla kingdom in Korean peninsula.

Anury cases were very rare and revealed atypical vestigial coccygeal vertebrae (6). In this study, we found that DKI shows an inherited anury or short tail like the human vestigial tail that has been occurred without abnormal physical condition in human (4,5). Anury or brachyury is commonly related with lethal genetic factor according T gene, which encodes a member of the T-box family of transcription factor (3,6,7). However, this case showed sturdy healthy condition in spite of the congenital anury. Also, it did not reveal any coccyx traces and showed complete caudal agenesis. Most anury dogs have an abnormal anal sphincter function because of the specific muscles of tail are responsible for normal defecation, which resulted in fecal staining of the hind limbs (2). However, in this case, the dog had not any defecation-related troubles. Domestic dog breeds show a wide variety of morphologies and offer excellent opportunities to study the molec-

Table 2. Gross morphological survey of Dongkyung-i

No	Age (year)	Sex	Coat (color)	Ear	Eye (color)	Weight (kg)	Hair (cm)	Tail (cm)
1	4.8	M	B	E	B	27	3.1	1
2	3.9	M	B	E	B	24	3	0
3	3	M	B	E	B	23	3.6	4.5
4	2.6	M	B	E	B	23	2.9	0
5	2	M	B	E	B	24	3.3	1.5
6	0.5	M	B	E	B	14	3.6	0
7	9	F	B	E	B	21	3.7	3.2
8	3.9	F	B	E	B	23	3.9	1.5
9	3	F	B	E	B	18	3.6	5.5
10	3	F	B	E	B	23	4.2	2
11	3	F	B	E	B	24	4.1	1
12	3	F	B	E	B	22	3.8	0
13	2.6	F	B	E	B	22	3.2	0
14	2	F	B	E	B	21	3.3	0
15	2	F	B	E	B	20	3.4	0
16	2	F	A	E	B	19	4	1
17	2	F	B	E	B	22	4.1	1
18	1.8	F	B	E	B	23	3.7	0
19	1.6	F	B	E	B	18	3.6	1.5
20	1.4	F	B	E	B	19	3.7	0
21	1	F	B	E	B	20	5.2	0
22	1	F	B	E	B	21	3.2	5
23	0.5	F	B	E	B	13	3.8	0
Mean±SD						22.6±3.21	3.65±	1.24±1.71

M: male, F: female, B: brown, A: ash, E: erect

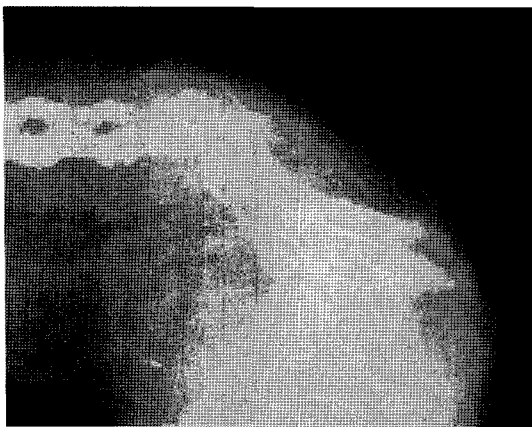


Fig 3. Lateral view of x-ray. The photo shows no coccygeal vertebrae in Dongkyung-i.

ular genetics of phenotypic traits (3). We are interested in exploring this case and need to investigate the genetic basis of a short-tail trait in future. The Schipperke was called gen-



Fig 4. Ventrodorsal view of x-ray. The radiograph reveals the absence of coccygeal vertebrae in Dongkyung-i.

erally a tailless dog, which looks rather like Spitz dogs and Belgian sheepdogs, is thought by some to be descended from the Leuvenaer, a small sheepdog from Louvain in the Flemish provinces of Belgium (1,6). However, the Schipperke has several coccygeal bones as a short tailed dog (1,6). In this study, we found congenital complete anury and caudal agenesis in DKI dogs. DKI dogs were obviously different from Schipperke dog in the points of body appearance and coccygeal absence.

We concluded that DKI is a Korean native canine breed originated from an ancient kingdom by bibliographical proofs and characterized as short or non-tail dog. Also, we suggested that this characteristic dog is valuable to develop as a Korean native breed and needed further studies of genetic pedigree and other breeding.

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무미와 단미로 특징되는 동경이에 대한 연구

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요 약 : 최근 댕견으로 불리는 동경이에 대한 과학적 연구는 현재까지 거의 없는 실정이며, 본 연구는 동경이의 형태학적 특징을 조사하기 위하여 수행되었다. 연구 결과 동경이는 활동적이고 체격이 단단하고 사람과 친화적인 것을 알 수 있었다. 형태학적으로 평균 22.6 kg의 체중을 보여 중형견으로 분류되었고 피모색은 주로 황갈색으로 짧은 털을 가지고 있었고 외관상 골반이 단단하고 꼬리가 없거나 매우 짧았다. 방사선학적 연구 결과 꼬리의 미추가 형성되지 않았거나 미약한 것을 알 수 있었다. 이러한 연구 결과로부터 한국 고유 품종의 하나인 동경이의 특징은 무미 또는 단미인 것을 알 수 있었다. 향후 혈통에 대한 유전학적 연구의 진행으로 한국 고유의 특성 있는 품종의 개발 가치가 있을 것으로 판단된다.

주요어 : 동경이, 댕견, 무미, 단미, 개.