

A Retrospective Study on Canine Hip Dysplasia in Different Breeds in Egypt

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Abstract: The aim of the present work was to study the incidence of the canine hip dysplasia (CHD) among different breeds of dogs in Egypt to see how we are far away from the CHD problem. A retrospective study based on the database of the 2013 archive at the Referral Veterinary Hospital in Egypt was carried out to determine the incidence of canine hip dysplasia in Egypt. A total of 8956 dogs were admitted to the hospital during this year. Dogs with suspected CHD were subjected to complete case history and thorough clinical examination. Final diagnosis of CHD based upon hip radiography and color Doppler ultrasonography. Out of 8956 dogs, 2058 animals had CHD representing 22.9% of the total examined dogs. Gait abnormalities, difficulty in rising, climbing stairs or in jumping over obstacles were the reported clinical signs of CHD. The incidence of CHD among different examined dogs, breeds was 36.14%, 32.68%, 30.78%, 27.28%, 27.23%, 23.99%, 22.64%, 17.1%, 13.33%, 12.5%, 11.62%, 7.31%, 7.21%, 5.52%, 5.51%, 5.35%, 3.4%, 3.3%, 2.59%, 1.44%, 1.17%, 1.14%, 1.05%, 0.74%, 0.64% and 0% in German shepherd, Saint Bernard, Rottweiler, Golden retriever, Labrador retriever, Caucasian Shepherd, Siberian husky, Cane corso, Bulldog, Akita, Dogo argentino, Kangal Maltese, Griffon, Pekinese, Old English mastiff, American pit-bull, Pointer, Bull mastiff, Dalmatian, York shire, Boxer, Doberman, Great Dane, Cocker spaniel, Egyptian pharaoh hound, French mastiff, Ridge back and the Mixed breed, respectively. The incidence of CHD was 31.79%, 19.29%, 5.59% and 4.29% in large-sized breeds, giant size breeds, medium-sized breeds and small-sized breeds. The obtained results should encourage the dog owners, breeders and the Egyptian Kennel Clubs to start and continue the implementation of the selection program of purebred dog breeds free from hip dysplasia on the basis of radiological hips examination, in order to further decrease this high incidence of CHD in Egypt.

Key words: Canine Hip Dysplasia • Dogs • Puppy Line • Doppler • Hip Laxity

INTRODUCTION

Hip dysplasia (HD) is an inherited, non-congenital disease that is particularly prevalent in large and giant breeds of dogs [1-4]. It is also considered a biomechanical disease characterized by abnormal development of the hip joint and can be a highly debilitating condition for both working and pet dogs [5, 6]. It could be expressed through a combination of genetic and environmental factors. Further influenced by nutrition and possibly hormonal factors [7].

This condition was first described by Schnelle [8] and was thought to be a rare condition. Little to no further information was added to his report over the following

decade, due primarily to limited availability of radiographic equipment and radiographic expertise within the veterinary profession.

Nowadays, CHD is recognized as the most commonly diagnosed orthopedic disease of large breeds of dogs [9]. The prevalence of this disease is highly variable between breeds [10, 11]. It is accepted that the coxofemoral joint is normal at birth and the HD is a developmental disorder [12].

The Orthopedic Foundation for Animals (OFA) database talked about the incidence percent of the CHD in 154 breeds [13]. The Orthopedic Foundation for Animals (OFA) database has been theorized as reporting a lower prevalence of HD than is truly present in the general population [14].

Hip dysplasia is the most important cause of osteoarthritis of the hip in dogs. Incidence ranges from 0.9% for the Borzoi to 47.4% for the Saint Bernard dogs radiographically evaluated by the Orthopedic Foundation for Animals [15]. The disease rarely occurs in dogs that have a mature body weight of less than 11 to 12 kg. Although hip dysplasia has been observed in toy breeds and cats, their unstable hips do not typically produce the bony changes common in heavier dogs. However, coxofemoral luxation after trivial trauma is seen [16].

There is good evidence that heritable factors predispose to the condition. The mode of inheritance is thought to be a polygenic dominant trait with incomplete penetrance. Few genes affect the osseous skeleton primarily. The changes in bone merely reflect changes that occur in the soft tissues (Cartilage, connective tissue and muscle). There is little doubt that the environment acts in conjunction with the genotype in producing a phenotype. As a result factors such as nutrition, growth rate and trauma/exercise may influence the development of dysplasia [17].

MATERIALS AND METHODS

The present study was done after co-ordination between Faculty of Veterinary Medicine, Alexandria University and the Veterinary Referral Hospital in Cairo, Egypt under the rules of animal use and care committee.

Animals: This study was performed on 8956 dogs admitted to the hospital during the year of 2013. Out of these cases, 5831 dogs were admitted to the department of internal medicine for medical investigations or the normal routine work for dogs such as de-worming, vaccinations and external parasites control. The owners of these dogs were asked to fill in a questionnaire which included the previous history of hind-limb clinical problems or complaint and the previous hip assessment using radiography or ultrasound. A total number of 3125 dogs were admitted or referred to the hospital for surgery or diagnostic imaging and subjected to hip radiography and hip color Doppler ultrasound in some cases.

Clinical Examination: A complete clinical examination including observation of the patient at rest, walking and trotting and re-examination after vigorous exercise was carried out. The Ortolani test was also used as a physical manipulation examination for diagnosis of hip joint laxity [18- 20].

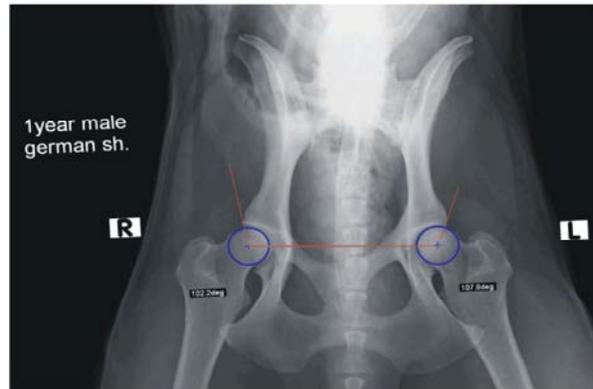


Fig. 1: Radiograph showing Norberg angles in both coxofemoral joints for FCI grading

Radiographic Examination: The standard ventrodorsal view was used as a universal view that involved placing the dog in dorsal recumbency on the X-ray table; with the rear limbs extended parallel to each other and the stifles internally rotated [3].

Radiography procedures were done under deep intravenous sedation using 0.02 mg/kg medetomidine, 0.1 mg/kg butorphanol and 0.02 mg/kg atropine sulphate [4] using digital X-ray machine (Siemens, Germany) and processing was done using FCR (Prima of Fuji, Japan). Hip scoring method was done using Federation Cynologique International scoring mode [21] by measuring Norberg angle (Fig. 1). The radiographic setting factors were 50-60 kVp and 10 mAs. Radiographic findings of the femoral head and neck were also used in the early diagnosis of CHD [7].

Ultrasonographical Examination: It was done using the color Doppler ultrasound for both joints in 82 cases according to the previous study [22]. Sonography was done using Medison device (Sonoace RC, South Korea) connecting with a 5-10 MHz linear transducer after using coupling gel.

RESULTS

Out of 8956 dogs, 2058 animals had CHD representing 22.9% of the total examined dogs. The clinical presentation of dogs with HD was very variable and does not correlate with the radiographic changes in joint morphology. Gait abnormalities, such as stiffness, reduced height of step, shortened stride length, bunny hopping, difficulty in rising, climbing stairs or in jumping over obstacles were the most common clinical signs.

Table 1: Distribution of the hip dysplasia among the different breeds of examined dogs

No.	Breed	Examined dogs	Affected dogs	%
1	German shepherd	1967	711	36.14%
2	Saint Bernard	1715	202	32.68%
3	Rottweiler	810	528	30.78%
4	Golden retriever	618	221	27.28%
5	Labrador retriever	544	134	27.23%
6	Caucasian Shepherd	492	107	23.99%
7	Siberian husky	446	24	22.64%
8	Cane corso	344	35	17.07%
9	Bulldog	205	12	13.33%
10	Akita	168	3	12.5%
11	Dogoargentino	154	5	11.62%
12	Kangal	154	3	7.31%
13	Maltese	135	7	7.21%
14	Griffon	134	19	5.52%
15	Pekinese	127	7	5.51%
16	Old English	117	9	5.35%
17	American pit-bull	106	19	3.4%
18	pointer	97	1	3.3%
19	Bull mastiff	95	4	2.59%
20	Dalmatian	90	1	1.44%
21	York shire	87	1	1.17%
22	Boxer	85	1	1.14%
23	Doberman	69	1	1.05%
24	Great Dane	43	1	0.74%
25	Cocker spaniel	41	1	0.64%
26	Egyptian pharaoh	30	--	0%
27	French mastiff	24	--	0%
28	Ridge back	24	--	0%
29	Mixed breed	21	--	0%
30	Jack Russell	7	--	--
31	Chow Chow	3	--	--
32	Beauceron	2	1	--
Total		8956	2058	22.9%

Table 1 shows the distribution of the hip dysplasia among the different breeds of examined dogs. Table 2 shows the distribution of the hip dysplasia among the different breeds classified according to the size of canine breeds.

The most commonly affected dog's breed was German shepherd (36.14%) and least affected breeds were Egyptian pharaoh hound, French mastiff, Ridge back and Mixed breed (0% each) as shown in (Fig. 2). In addition, CHD was commonly recorded in large size breeds (31.79%) than giant breeds (19.29%), medium size breeds (5.59%) and small and toy size breeds (4.29%).

Radiographic Findings: Out of 2058 dogs with CHD, 1602 dogs representing 77.8 % of the total affected dogs had bilateral HD (Fig. 3a) and 456 dogs representing 22.2 % of the total affected animals had unilateral HD (Fig. 3b).

Out of 2058 dogs with CHD, 1556 dogs representing 75.7% of the total affected dogs had incomplete HD (Fig. 3 a & b) and 502 dogs representing 24.3 % of the total affected animals had complete HD (Fig. 3 c & d).

Complete femoral head degeneration was reported in two dogs representing 0.09% of the total affected dogs.

Complete bilateral HD with bilateral femoral head rotation was recorded in 6 dogs representing 0.3% of the total affected dogs (Fig. 3 d).

Early radiographic findings in young dogs less than 1 year old included, caudolateral circumferential femoral head osteophytes (Fig. 3 a& b), puppy line (Fig. 3b) and metaphyseal sclerosis (Fig. 3b). Absence of these radiographic findings was observed in dogs with complete HD (Fig. 3c).

Incidence of hip dysplasia among most common breeds in Egypt

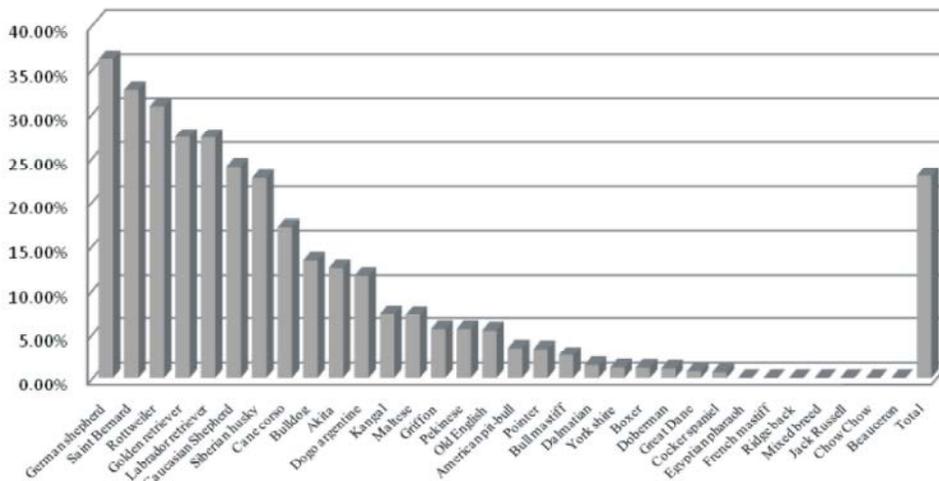


Fig. 2: Distribution of CHD among the different examined breeds

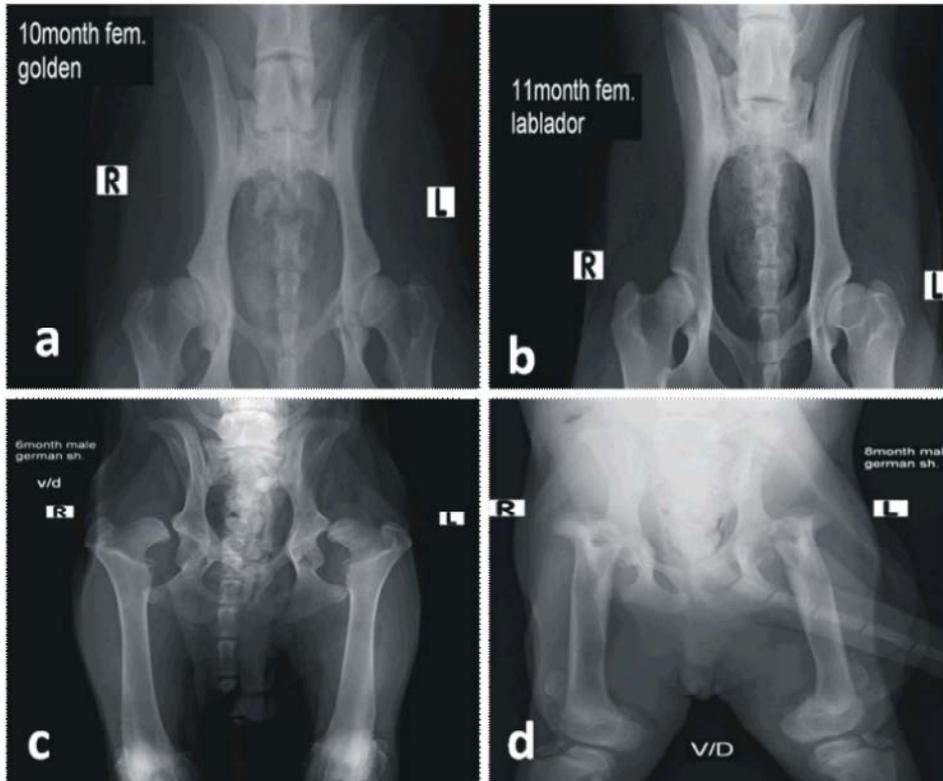


Fig. 3: (a) Photoradiograph showing bilateral incomplete hip dysplasia with bilateral caudolateral circumferential femoral head osteophytes in a 10-month-old female Golden retriever
(b) Photoradiograph showing unilateral incomplete hip dysplasia with left puppy line and caudolateral circumferential femoral head osteophytes and right metaphyseal sclerosis in an 11-month-old female Labrador retriever
(c) Photoradiograph showing complete bilateral hip dysplasia in a 6-month-old male German shepherd puppy.
(d) Photoradiograph showing complete bilateral hip dysplasia with bilateral complete femoral head rotation in an 8-month-old male German shepherd puppy

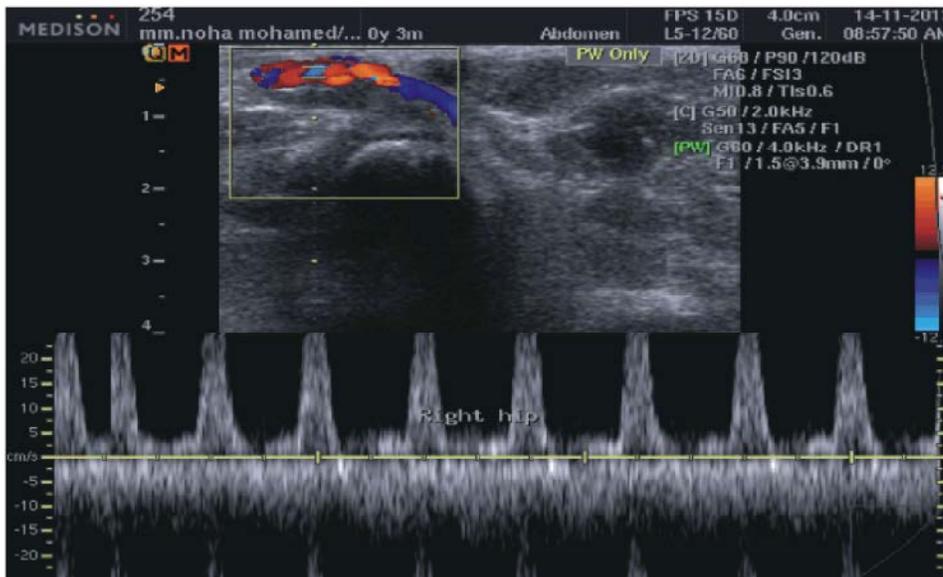


Fig. 4: Doppler ultrasonogram of right hip joint showing the blood velocity of coxofemoral blood vessels

Table 2: Showing distribution of the hip dysplasia among the examined dogs in relation to the body size

Size	No.	Breed	Examined dogs	Affected dogs	%
Giant Breeds	1.	Saint Bernard	618	202	32.68%
	2.	Caucasian Shepherd	446	107	23.99%
	3.	Akita	24	3	12.5%
	4.	Kangal	41	3	7.31%
	5.	Old English	168	9	5.35%
	6.	Bull mastiff	154	4	2.59%
	7.	Great Dane	135	1	0.74%
	8.	French mastiff	117	--	0%
	9.	Chow Chow	3	--	--
		Total	1706	329	19.29%
Large Breeds	10.	German shepherd	1967	711	36.14%
	11.	Rottweiler	1715	528	30.78%
	12.	Golden retriever	810	221	27.28%
	13.	Labrador retriever	492	134	27.23%
	14.	Siberian husky	106	24	22.64%
	15.	Beauceron	2	1	--
		Total	5092	1619	31.79%
Medium Breeds	16.	Cane corso	205	35	17.07%
	17.	Bulldog	90	12	13.33%
	18.	Dogoargentino	43	5	11.62%
	19.	American pit-bull	544	19	3.4%
	20.	Pointer	30	1	3.3%
	21.	Dalmatian	69	1	1.44%
	22.	Boxer	87	1	1.14%
	23.	Doberman	95	1	1.05%
	24.	Egyptian pharaoh	134	--	0%
	25.	Ridge back	24	--	0%
	26.	Mixed breed	21	--	0%
		Total	1342	75	5.59%
Small and Toy breeds	27.	Griffon	344	19	5.52%
	28.	Maltese	97	7	7.21%
	29.	Pekinese	127	7	5.51%
	30.	York shire	85	1	1.17%
	31.	Cocker spaniel	154	1	0.64%
	32.	Jack Russell	7	--	--
			Total	814	35
		Total	8956	2058	22.9%

Ultrasonographical Findings: The medial arterial supply of the coxofemoral joint was examined ultrasonographically. The medial circumflex femoral artery and the transverse branch were also identified. The pulsatility index, the mean velocity and the peak systolic velocity of the medial circumflex femoral artery were determined and no changes were observed (Fig. 4).

DISCUSSION

Canine hip dysplasia is a common orthopedic affection. The orthopedic Foundation for Animals (OFA) database recorded the incidence percent of the CHD in 154 breeds [13]. The present study was carried out on 32 breeds of dogs which were really the most common

breeds in Egypt. According to the results of this study, the incidence of CHD in the examined dogs was 22.9%. In this respect, CHD was previously reported in 42%, 19.7% and 18.75% of the examined dogs [23-25]. This difference may be due to different distributions of dog breeds in the countries under the studies, selections of the breeding dogs, facilities and experiences to diagnose HD and environmental and management factors. The incidence of CHD among different dogs' breeds varies from country to country due to differences in the popularity of individual breeds in various countries, as well as greater or lesser success in the control of CHD [25-27].

In the current study, the most commonly affected breeds in Egypt were German shepherd, Saint Bernard, Rottweiler, Golden retriever, Labrador retriever, Caucasian

shepherd, Siberian husky and Cane corso while the most resistant breeds against CHD were Egyptian pharaoh, French mastiff, Ridge back, mixed breed, Cocker spaniel, Dalmatian, Great dane, Doberman, Boxer and York shire. Most of the resistant breeds are hunting dogs which have similar skeleton with various sizes. These results were more or less similar to that previously observed [12].

The prevalence and severity of CHD were most likely related to the breed's predisposition to the disease and the previous absence of a radiographic HD control program [3]. In many countries in the world, good results were achieved in the reduction of the HD frequency in breeding of various dog breeds [28].

Regarding German shepherd, the incidence of CHD was 36.14%. This percentage was little bit greater than that reported by the OFA preliminary hip data (32.9%) and its rank was 40th of all over the recorded breeds of OFA. While in Saint Bernard, it was 32.68% of the examined dogs although it was 46.9% according to the OFA for the hip database and its rank was the sixth all over the recorded breeds of OFA [12]. As regards Rottweiler, CHD was recorded in 30.78% of the examined dogs while it was 20.2% according to the OFA for the hip database and its rank was the 33th of all over the recorded breeds of OFA [12]. In Golden retriever, it was recorded in 27.28% of examined cases while it was 19.5% according to the OFA for the hip database and its rank was the 35th of all over the recorded breeds of OFA. In Labrador retriever, it was recorded in 27.23% of examined cases while it was 11.7% according to the OFA for the hip database and its rank was the 89th of all over the recorded breeds of OFA [12]. These differences could be attributed to the differences between countries under the studies.

On the other hand, it was recorded in 23.99% of the examined Caucasian shepherd dogs and no record in the hip database of OFA for this breed was available.

In Siberian husky, it was recorded in 22.64% of examined cases while it was 2% according to the OFA for the hip database and its rank was the 167th of all over the recorded breeds of OFA. Regarding Cane corso breed, it was recorded in 17.07% of examined cases while it was 39% according to the OFA for the hip database and its rank was the 11th of all over the recorded breeds of OFA [12].

On contrary, it was recorded in 13.33% of examined Bulldog while it was 71.6% according to the OFA for the hip database and its rank was the first of all over the recorded breeds of OFA.

In Akita breed, it was recorded in 12.5% of examined cases which is nearly similar to that recorded by the OFA for the hip database (12.8%) and its rank was the 77th of all over the recorded breeds of OFA.

Regarding Dogo argentine, Kangal, Maltese, Griffon and Pekinese, CHD was recorded in 11.62%, 7.31%, 7.21%, 5.52% and 5.51% of the examined dogs respectively and no available records in the hip database of OFA were reported. The incidence of CHD in Old English mastiff was 5.35% while it was 19.4% according to the OFA for the hip database and its rank was the 36th of all over the recorded breeds of OFA.

The incidence of hip dysplasia in American pit-bull was 3.4% of the examined cases while it was 24.3% according to the OFA for the hip database and his rank was the 27th of all over the recorded breeds of OFA. In Pointer, it was recorded in 3.3% of examined cases while it was 7.8% according to the OFA for the hip database and its rank was the 121th of all over the recorded breeds of OFA. Regarding Bull mastiff, it was recorded in 2.59% of examined cases while it was 24.2% according to the OFA for the hip database and its rank was the 29th of all over the recorded breeds of OFA [12].

Dalmatian breed had 1.44% cases of CHD while it had 4.4% according to the OFA for the hip database and its rank was the 150th of all over the recorded breeds of OFA. In York shire breed it was recorded in 1.17% of examined cases while it was 6.8% according to the OFA for the hip database and its rank was the 126th of all over the recorded breeds of OFA. Regarding Boxer, it was recorded in 1.14% of the examined dogs while it was 11% according to the OFA for the hip database and its rank was the 94th of all over the recorded breeds of OFA. In Doberman, it was recorded in 1.05% of the examined cases while it was 6.1% according to the OFA for the hip database and its rank was the 167th of all over the recorded breeds of OFA [12].

In Great Dane, it was recorded in 0.74% of examined cases while it was 12% according to the OFA for the hip database and its rank was the 82th of all over the recorded breeds of OFA. Regarding Cocker spaniel, it was recorded in 0.64% of examined cases while it was 6.5% according to the OFA for the hip database and his rank was the 129th of all over the recorded breeds of OFA [12].

In contrast, mixed breed and Egyptian Pharaoh Hound showed no record of hip dysplasia while it was 2.7% according to the OFA for the hip database and its rank was the 162th of all over the recorded breeds of OFA. In French mastiff, it was recorded in 0% of examined cases and no available record in the hip database of OFA [12].

Regarding Ridge back, there was no record of hip dysplasia in the examined dogs. On the other hand, Stanin *et al.* [25] recorded CHD in 33.3% of the examined Ridge back dogs.

Most of the large working and sporting breeds of dogs were well represented in this study. This is in agreement with the result of Brinker *et al.* [16].

The incidence of CHD was 19.29%, 31.79%, 5.59% and 4.29% in giant, large size, medium size and small and toy size breeds. These results were agreed with many previous studies [1-4]. In this respect, Denny and Butterworth [17] said that large breeds appeared more susceptible to the development of clinical signs although even in these breeds, many dogs with radiographic signs would remain asymptomatic. In addition, small breeds of dogs were also affected, but were less likely to show symptoms [29].

CONCLUSION

Canine hip dysplasia is a common orthopedic affection among dogs in Egypt and the dog owners, breeders and the Egyptian Kennel Clubs have to start and continue the implementation of the selection program of purebred dog breeds free from hip dysplasia on the basis of radiological examination of the hips, in order to further decrease the frequency of HD.

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