Exposure factors formulae for Ventro-Dorsal (VD2) and Dorso- Ventral (DV) projections of the pelvis in canine radiography

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Abstract

The main objective of this study is to formulate the optimum exposure factors for German shepherd dog's in conventional radiography using the weight as a reference. The study was conducted in Police Dogs Administration (Ministry of Interior, X-ray Department), 24 German Shepherds dogs were put under investigation which (8 males and 16 females). A Poly mobile Siemens X-ray Machine was used. The result of this study showed that the Kv and the mAs had a direct linear association with body mass in both Ventro-Dorsal extended view (external rotation,(VD2) and Dorso- Ventral flexed hips and knees (DV) projections of the pelvis in canine radiography.

Key Words: Exposure factors, formula , canine ,body mass index

INTRODUCTION

The German shepherd (German: *Deutscher Schäferhund),* also known as an Alsatian, is a breed of large-sized dog that originated in Germany.[1] German Shepherds are a relatively new breed of dog, with their origin dating to 1899. As part of the Herding Group, German Shepherds are working dogs developed originally for herding and guarding sheep. Because of their strength, intelligence and abilities in obedience training they are often employed in police and military roles around the world.[2] German Shepherds currently account for 4.6% of all dogs registered with the American Kennel Club. Due to their loyal and protective nature, German Shepherds are one of the most popular breeds. German Shepherds are a very popular selection for use as working dogs. They are especially well known for their police work, being used for tracking criminals, patrolling troubled areas, and detection and holding of suspects. Additionally thousands of German Shepherds have been used by the military. Usually trained for scout duty, they are used to warn soldiers to the presence of enemies or of booby traps or other hazards.[3] German Shepherds have also been trained by military groups to parachute from aircraft[4]. The German Shepherd Dog is one of the most widely used breeds in a wide variety of scent-work roles. These include search and rescue, cadaver searching, narcotics detection, explosives detection, accelerant detection, and mine detection dog, among others. They are suited for these lines of work because of their keen sense of smell and their ability to work regardless of distractions.[3] At one time the German Shepherd Dog was the breed chosen almost exclusively to be used as a guide dog for the visually impaired. In recent years, Labradors and Golden Retrievers have been more widely used for this work, although there are still German

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Shepherds being trained. A versatile breed, they excel in this field due to their strong sense of duty, their mental abilities, their fearlessness, and their attachment to their owner. German Shepherd Dogs are used for herding and tending sheep grazing in meadows next to gardens and crop fields. They are expected to patrol the boundaries to keep sheep from trespassing and damaging the crops. In Germany and other places these skills are tested in utility dog trials also known as HGH (Herdengebrauchshund) herding utility dog trials.[5] Due to their royal and Protective nature the breed is amongst the most registered.[6] The breed was named Deutscher Schäferhund by Von Stephanitz, literally translating to "German Shepherd Dog". The breed was so named due to its original purpose of assisting
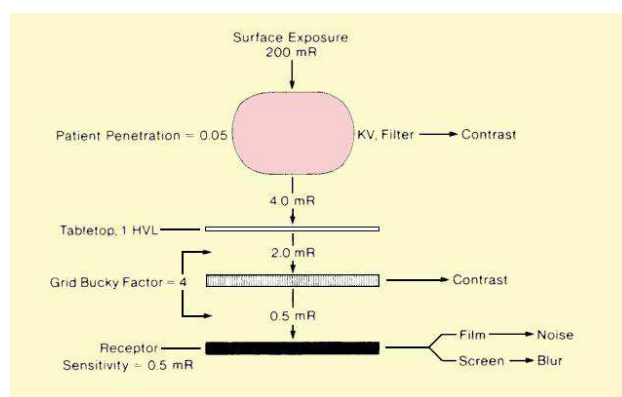

Figure (1): Demonstrates the Factors That Determine Exposure Values in Radiography [10].

shepherds in herding and protecting sheep. At the time, all other herding dogs in Germany were referred to by this name; they thus became known as Altdeutscher Schäferhunds or Old German Shepherd Dogs. Shepherds were first exported to Britain in 1908, and the UK Kennel Club began to recognize the breed in 1919.[7,8] The direct translation of the name was adopted for use in the official breed registry; however, at the conclusion of first

World War, it was believed that the inclusion of the word "German" would harm the breed's popularity.[7] Due to the anti-German sentiment of the era[8].The breed was officially renamed by the UK Kennel Club to "Alsatian Wolf Dog".[7] The name Alsatian remained for five decades, until 1977, when successful campaigns by dog enthusiasts pressured the British kennel club's to allow the breed to be registered again as German Shepherd Dogs.[8,9]

The exposure, or dose, to a specific point within a patient's body is determined by a combination of factors. One of the most significant is whether the point in question is in or out of the primary beam. Points not located in the direct beam can receive exposure from scattered radiation, but this is generally much less than the exposure to points within the beam area. The factors that determine exposure levels to points within the body will be discussed in

Reference the situation illustrated in the following figure.

Exposure techniques are determined by measuring the thickness of the body part to be radiographed. Take the measurement with the use of a caliper at the thickest area to be radiographed. Each radiographic view will have different exposure settings depending on the thickness of the body part.[11] Use of this web site constitutes acceptance of the eHow Terms of Use and Privacy Policy. Ad Choices en-US .In any x-ray examination, there is considerable variation in exposure from point to point within the patient's body. This must be considered when expressing values for patient exposure. In fact, when exposure values are given, the specific anatomical location of the

Figure (2).Demonstrates Ventro-Dorsal external rotation (VD1) modified projection

DV projection of the pelvis as shown in (Fig3), where the sedated dog was placed in sternal recumbency with the fore limb flexed at the elbows and the hind limbs flexed at the hips and knees, avoid rotation of the pelvis. The caudal spine was extended caudally to maintain the body in position. Centre point at the level midway between the iliac crest and the lower border of the hip joint in the mid line.

Figure (3).Demonstrates Dorso-Venteral flexed hips and knees view (DV) modified projection

value should also be stated. Some exposure patterns are characteristic of the different x-ray imaging methods. A review of these patterns will give us some background for considering factors that affect exposure and applying methods to determine actual exposure values.

MATERIALS AND METHODS

The study was conducted in Police Dogs Administration (Ministry of Interior, X-ray Department). Twenty four German
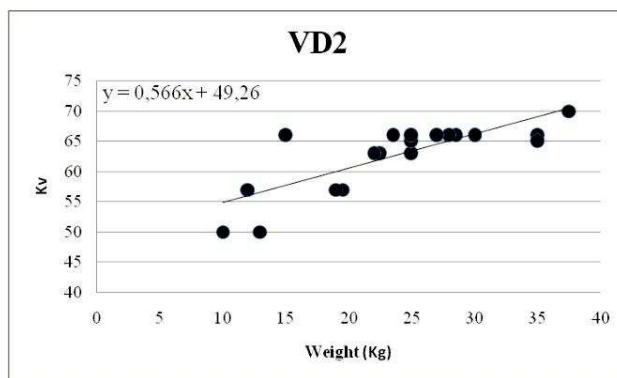

Figure (4): Shows the correlation between the Kv and the weight in Ventro- Dorsal projection (VD2)
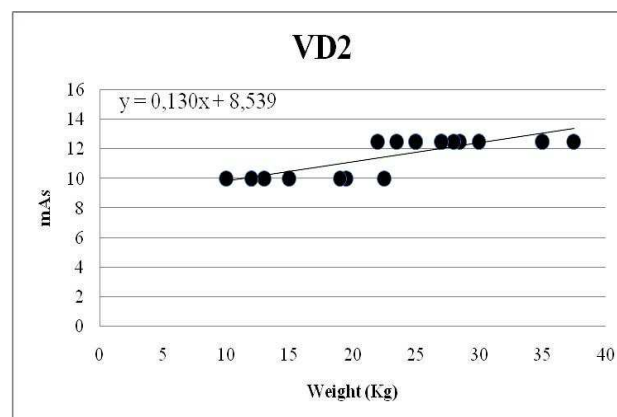

Figure (5): Shows the correlation between the mAs and the weight in Ventro- Dorsal projection(VD2)
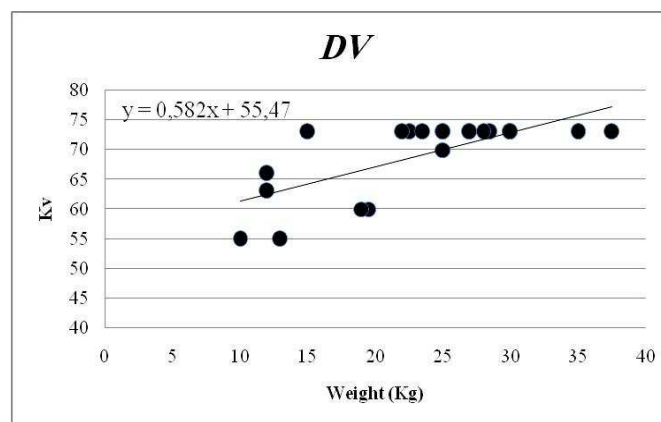

Figure (6): Shows the correlation between the Kv and the weight in Dorso-Venteral projection (DV)
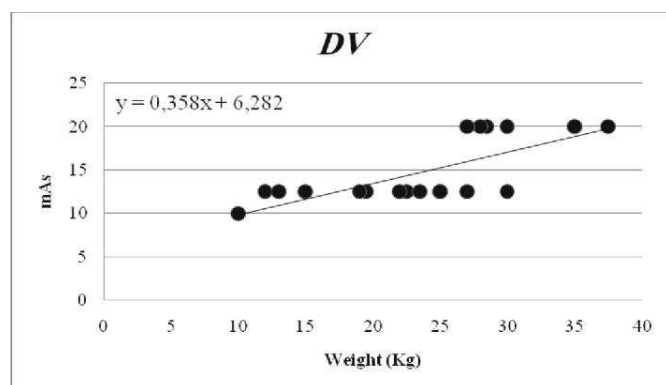
Figure (7): Shows the correlation between the mAs and the weight in Dorso-Venteral projection (DV)

shepherd dogs (8 males and 16 females) were put under investigation (8 males and 16 females). Their average age was 5.4 years (ranged 0.5 to 13 years) with an average body mass of 27.2 Kg (ranged from 10 to 37.5 Kg). Body weight and exposure factors have been used to develop a formula of kV and mAs for canine in pelvic radiography by using Ventro-Dorsal extended view (external rotation, (VD_2) and Dorso- Ventral flexed hips and knees (*DV*) which are modified as new techniques made by the author.VD_2 as technique as shown in Fig 2 where anesthesia should be given prior the examination. This is modified from the standard projection for the pelvis and for evaluation hip dysplasia and other hip conditions. The pelvis should be symmetrical the forelimb brought a cross the chest the hind limb slightly flexed at the knees and put in external rotation. Center Point: To the mid line above the level of the greater trochantors.[12]

The formulae

For VD2 Projection

KV=0.566xweight+49.26…………………...   (1)

mAs= 0.130 x weight + 8.539………………...   (2)

or DV Projection

KV=0.582 × weight +55.47………………...   (3)

mAs=0.358× weight + 6.282………………...   (4)

To verify the reliability of the formula it has been applied to 5 German shepherd dogs by knowing the weight of these dogs. The exposure factors are determined and the formula is proved to be reliable.

DV projection of the pelvis as shown in (Fig3), where the sedated dog was placed in sternal recumbency with the fore limb flexed at the elbows and the hind limbs flexed at the hips and knees, avoid rotation of the pelvis. The caudal spine was extended caudally to maintain the body in position. Centre point at the level midway between the iliac crest and the lower border of the hip joint in the mid line.[12]

RESULTS

24 German shepherd dogs from the thirty dogs sample were chosen because all the 24 dogs' weight is concentrated on pelvic region even when their weight varies. The researcher took the exposure factors and the dog's weight to come out with a formula which determines the exposure factors when the weight of the body is known, for radiography of the pelvis when doing,

VD1, VD2 and DV projections.

DISCUSSION

To obtain optimum radiographs which lead to accurate diagnosis we need suitable exposure factors parameter so the researcher formulate the exposure factors for German shepherd dogs using the body weight ignoring the mass index because the German shepherd had consistency in the body weight . For the human the body mass index and the patient weight were well correlated with the kV and mAs.[13].The researcher use lines stepwise regression to select the suitable variable that can account to the variation in the exposure factors, therefore out of 4 variables the procedure select the weight as the best predictor which can be used to estimate the kV & mAs . The liner equation shows that there is a direct proportionality between kV, mAs & the weight with a coefficient equal 0.56 kV/kg and 0.13mAs/kg respectively in (VD2) projection this means that the kV & mAs increase as a result of weight increase. On the other hand the liner equation shows that there is a direct proportionality between kV, mAs & the weight with a coefficient equal 0.58 kV/kg and 0.36 mAs/kg respectively in (DV) projection this means that the kV & mAs increase as a result of weight increase. The selection of weight as a predictor is consistence with the fact that Germen Shepherd dogs their weight concentrated on the pelvic region.

CONCLUSIONS

This study provides a valuable information regarding German shepherd. The empirical formulae based on the dog weight have good accuracy and it will help the radiographers to choose the accurate exposure factors promply.

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