

Correlating Height, Weight, Age and Amount of Exercise of Companion Dog: A Case Study for Yong-In City

Background: Exercise is necessary for the health of companion dogs. It is necessary to determine the relationship between height, weight, age and amount of exercise for the purpose of companion dog's health.

Objectives: A survey was conducted in this study to small-dog owners living in Yongin city, Gyeonggi-do about their canine healthcare awareness.

Design: Questionnaire design.

Methods: The questionnaire was composed of exercise amount, type of exercise, and the necessity of exercise, general health condition, and environment. A total of 139 survey results were obtained. The average value of each item was analyzed and expressed in terms of frequency and percentage. Then, Pearson's correlation coefficients were used to find the relationship between these items.

Results: The weight and height were not shown to have a significant difference in the amount of exercise in the results. The weight had a weak positive correlation with "exercise time of canine per day". The age had a weak negative correlation with "the number of canine exercise per week" and "frequency of canine exercise per day", while it had a weak positive correlation with "self-assessment of canine lack of exercise".

Conclusion: Based on this study, it is believed that in the future, various environments where dogs can exercise are believed to be necessary for the era of convergence.

Keywords: *Industrial management; Companion dog; Convergence era; Companion animal; Exercise*

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INTRODUCTION

Recently, the amount of single-person households has grown fast due to the rapid population cliff phenomenon in South Korea, leading to continuously increasing number of people living alone as well as the ownership of companion animals.¹ As such, the formation of relationship between dogs and people emerges, which has demonstrated a close link between personal health and animals.^{2,3} It is believed that companion animals can contribute positively to the psychological status and physical activities of people.⁴⁻⁶ Various studies showed that activities with dogs could help reduce depression,⁷ improving mental functions⁸ and communication,⁹ as well as strength-

ening physical functions among humans.⁶ While walking for dog health, dog owners can get a feeling of happiness which is a positive result from dog walking.¹⁰ Therefore, dog owners' awareness about their dog health condition is important and can improve the health of dog owners in the long run.¹¹

Meanwhile, the dog owners improve the health of their companion dogs by providing them with home,¹² food,¹³ medical care,¹⁴ and companionship.¹⁵ Studies suggest that interest of owners to the health of their dogs are necessary to benefit the health of their pets.^{1,16} For example, owners should be conscious of the change in age and weight of their dogs since these can be important parameters to indicate health deterioration.¹⁷ However, most South Korean animal

healthcare centers focus merely on disease, education, food, and oral care.^{13,14,16,18} On the other hand, similar to the fact that exercise is vital for the healthcare and disease prevention of humans, dog owners should also be aware that exercise plays an important role regarding the health and welfare of their dogs.¹⁹

Animals have similar exercise physiology to humans. Significant research has been conducted on animals to improve the understanding of exercise physiology in humans.²⁰ Hence, we should also focus on improving and maintaining animal health with exercise.

Reports suggest the need for regular health check-ups for musculoskeletal diseases in companion dogs since it accounts for 11.8% of veterinary hospital visits, which has significantly increased.²¹ Aging companion dogs are more prone to degenerative diseases, and failing to control their caloric intake could easily expose them to obesity.¹⁹ Additionally, safety accidents and conflicts in city parks due to companion dog activities are on the rise as urbanization rates increase,²² resulting in reduced space for companion dog exercises. Therefore, attention and increased awareness are needed to maintain the health of companion dogs.

Regarding the companion dog health, medical treatment systems differ from those for humans, along with higher medical fees and vague pricing standards.²³ Because there is no relevant support policies for companion animal medical treatment for low-income owners in reality, a higher awareness of preventative healthcare for companion animals is essential.²³ This study was limited to companion dogs among various companion animals. In south Korea, dogs have the highest percentage of companion animal ownership.²⁴ Therefore, we chose companion dogs and dog owners as the most easily accessible companion animals. As no studies have been performed specifically for owner awareness of dog health conditions, this study investigates the perceived necessity and awareness of owners regarding the dog health and provides the baseline data for the health of companion dogs.

SUBJECTS AND METHODS

Subjects

The survey in this study was conducted in Respia Lake Park, Giheung-dong, Yongin-si, wherein there were approximately 300 visitors per day. Adults aged

19–39 years, who walk together with their companion dogs in this park, were selected randomly. The survey took place between June to July 2018 and was limited only to owners currently residing in Yongin-si and living with their companion dogs. Those participants who did not want to be part of the survey were excluded, resulting in a total of 139 actual participants involved in the research. This study approved by the institutional review board of Yong-in University: No. 2-1040966-AB-N-01-20-1902-HSR-128-1.

Data Collection

The pilot test for the data collection in this research created the baseline data for the questionnaire design. In this study, after drafting the questionnaire, pre-test the questionnaire was conducted on several subjects. The final questionnaire was distributed after modified by checking errors and additional questions between the questions. The pre-survey assessed the amount of content, comprehensiveness, and appropriateness of terminologies in the questionnaire through 15 randomly selected participants. The main survey finalized the questionnaire based on the pre-survey evaluation to perform final data collection. “animal patient interview” from “animal physiotherapy”²⁰ was referenced when creating information provided on the questionnaire sheets. The questions consist of what dog owners feel about their pet’s general health condition, as well as the amount of exercise depending on the environment, and the necessity they believe for the health management of their dogs. The questionnaires were collected in-person by two people that were not personally connected in this research.

Questionnaire

The questionnaire comprises three sections

The first section asks about the general characteristics of companion dogs, such as sex, age, height, weight, presence of disease, perceived general health condition, veterinary hospital visits, and present disease type. The second section asks the environmental factors and exercise, including types of healthcare routine, floor types of home, presence of other companion animals within their living spaces, main activity locations, number of exercises per week, frequency and amount of exercise per day, as well as whether the dogs wear a leash. In the third section, the dog owners were asked about their perspectives regarding the necessity of exercise, healthcare, and

type of efforts they could make for the health improvement of their companion dogs.

1) Question about general health conditions: Questions about general characteristics and health conditions of companion dogs were created, evaluated, and then revised. This question was further divided into eight sub-questions, asking participants to write the age, height, and weight of their companion dogs and requesting them to tick the relevant box for gender and presence of disease question. Furthermore, the owners were asked to choose from five to six answers for the perceived health condition, the number of visits to the veterinary in the last 12 months, and type of present disease of their companion dogs.

2) Question about the amount of exercise depending on the environment: This question also comprises eight sub-questions that were developed by referring to “animal patient interview” from “animal physiotherapy”²⁰. It was then evaluated and revised to fit to the objective of this study. The sub-questions asked main places of activity of companion dogs, types of floor materials and presence of other animals in the same living spaces, types of healthcare routine, number of exercises per week, frequency and amount of exercise per day, as well as whether or not leash was used. The participants were requested to choose from four to six answers for each question.

3) Question about companion dog healthcare awareness of dog owners: The question about companion dog healthcare awareness of dog owners, was developed, evaluated, and revised. The question is subdivided into four sub-questions, each of which has a choice among five responses. These sub-questions ask the dog owners whether they feel that their dog lacks exercise if they consider regular exercise is required for their dogs, what kind of effort the owner could make to improve the health of their dogs, as well as what kind of exercises their pets require.

Data and Statistical Analysis

Data analysis was performed using SPSS 20.0 statistics software. To understand the tendency of the overall responses, we performed frequency analysis on the mean of each answer to obtain its frequency and percentage of the response. Pearson’s correlation coefficients were used to analyze the relationship between the sub-questions of 13 (the number of canine exercise per week), 14 (frequency of canine

exercise per day), and 15 (exercise time of canine per day) regarding the general health condition question asking the weight, height, and age of companion dogs, with the sub-questions of 17 (self-assessment of canine lack of exercise) and 18 (the need for canine exercise management) regarding the question asking dog owners about their views on the necessity of healthcare for their companion dogs.

RESULTS

General characteristics of small companion dogs

The general characteristics of small companion dogs that participated in this study are given in Table 1.

Table 1. General characteristics

| General characteristics | Subjects | |
|-------------------------------|---------------|------------|
| Gender | Male: 82 | Female: 57 |
| Canine years | 6.21 ± 7.57 | |
| Height (cm) | 37.77 ± 15.39 | |
| Weight (kg) | 5.95 ± 4.63 | |
| Disease presence | yes: 26 | no: 113 |
| Health degree | Frequency | Ratio(%) |
| Very unhealthy | 10 | 7.1 |
| Slightly unhealthy | 11 | 7.9 |
| Neither healthy nor unhealthy | 29 | 20.7 |
| Slightly healthy | 32 | 22.9 |
| Very healthy | 57 | 40.7 |
| Veterinary hospital visits | Frequency | Ratio (%) |
| No visit | 24 | 17.1 |
| One visits | 23 | 16.4 |
| Two visits | 30 | 21.4 |
| Three visits | 14 | 10.0 |
| Four or more visits | 48 | 34.3 |
| Disease type | Frequency | Ratio (%) |
| None | 60 | 42.9 |
| Nervous system | 5 | 3.6 |
| Musculoskeletal system | 27 | 19.3 |
| Integumentary system | 29 | 20.7 |
| Digestive system | 13 | 9.3 |
| Other diseases | 5 | 3.6 |

Exercises depending on the environment of small companion dogs

The exercises depending on the environment of small companion dogs that participated in this study a presented in Table 2.

Table 2. Exercise depending on the environment

| Variable | Frequency | Ratio (%) |
|---------------------------------|-----------|-----------|
| Types of floor materials | | |
| Vinyl floor | 61 | 43,6 |
| Wooden floor | 48 | 34,3 |
| Tile floor | 13 | 9,3 |
| Grass floor | 5 | 3,6 |
| Other floors | 12 | 8,6 |
| Place of activity | | |
| Stairs | 1 | 0,7 |
| Floor | 87 | 62,1 |
| Bed & sofa | 36 | 25,7 |
| Garden | 5 | 3,6 |
| Park | 10 | 7,1 |
| Other animals | | |
| None | 97 | 69,3 |
| One animal | 28 | 20 |
| Two animals | 7 | 5 |
| Three animals | 5 | 3,6 |
| Four or more animals | 2 | 1,4 |
| Types of healthcare | | |
| None | 7 | 5 |
| Walking | 99 | 71,2 |
| Massage | 27 | 19,4 |
| Toy play | 0 | 0 |
| Dog cafe | 6 | 4,3 |
| Others | 0 | 0 |
| Number of exercises | | |
| None | 21 | 15 |
| One time | 30 | 21,4 |
| Two times | 28 | 20 |
| Three times | 18 | 12,9 |
| Four or more times | 42 | 30 |

Table 2. Exercise depending on the environment

| Variable | Frequency | Ratio (%) |
|------------------------------|-----------|-----------|
| Frequency of exercise | | |
| None | 41 | 29,3 |
| One time | 76 | 54,3 |
| Two times | 11 | 7,9 |
| Three times | 2 | 1,4 |
| Four or more times | 9 | 6,4 |
| Exercise time | | |
| None | 16 | 11,4 |
| More than 10 minutes | 16 | 11,4 |
| More than 20 minutes | 20 | 14,3 |
| More than 30 minutes | 37 | 26,4 |
| More than 40 minutes | 50 | 35,7 |
| Types of canine leash | | |
| Wearing | 112 | 80 |
| Not wearing | 15 | 10,7 |
| Wearing or Not wearing | 9 | 6,4 |
| Others | 3 | 2,1 |

Necessity of healthcare for companion dogs recognized by their owners

The necessity of healthcare for companion dogs recognized by their owners who participated in this study is provided in Table 3.

Table 3. Necessity of healthcare of companion dogs recognized by their owners

| Variable | Frequency | Ratio (%) |
|-------------------------|-----------|-----------|
| Lack of exercise | | |
| Strongly disagree | 32 | 22,9 |
| Disagree | 20 | 14,3 |
| Neutral | 27 | 19,3 |
| Agree | 37 | 26,4 |
| Strongly agree | 23 | 16,4 |

Table 3. Necessity of healthcare of companion dogs recognized by their owners

| Variable | Frequency | Ratio (%) |
|---|-----------|-----------|
| The need for exercise management | | |
| Strongly disagree | 5 | 3.6 |
| Disagree | 2 | 1.4 |
| Neutral | 24 | 17.1 |
| Agree | 37 | 26.4 |
| Strongly agree | 71 | 50.7 |
| Canine owner's efforts | | |
| None | 4 | 2.9 |
| Food | 49 | 35 |
| Regular exercise | 55 | 39.3 |
| Hospital visit | 25 | 17.9 |
| Others | 6 | 4.3 |
| Types of healthcare | | |
| None | 4 | 2.9 |
| Strength exercise | 37 | 26.4 |
| Cardiovascular exercise | 82 | 58.6 |
| Stretching exercise | 11 | 7.9 |
| Others | 5 | 3.6 |

Relationship between the amount of exercise, weight, height, and age

The relationship between the necessity of healthcare of companion dogs, as well as their weight, height, and age is displayed in Table 4.

The weight and height were not shown to have a significant difference in the amount of exercise in the results. The weight had a weak positive correlation with sub-question 15 (exercise time of canine per day),

The age had a weak negative correlation with sub-questions 13 (the number of canine exercise per week) and 14 (frequency of canine exercise per day), while it had a weak positive correlation with sub-question 17 (self-assessment of canine lack of exercise).

DISCUSSION

This study aimed to investigate the awareness of the health of companion dogs by their owners residing in Yongin-si. Moreover, it examined the relationship between weight, height, and age, together with the amount of exercise and the necessity that owners felt for the healthcare of their dogs. As a result of the analysis, owners recognized the dogs are currently healthy, exercise and management are necessary as the dogs are age and gains weight. However, the exercise for the dogs is limited to walking and their living space to mainly indoors in prolonged city life. Previous studies have confirmed the awareness of dog owners against intestinal parasites in companion dogs, so the role of veterinarians has been focused on the health of companion dogs.^{25,26} This study highlights whether the efforts of dog owners or the role of animal physical therapists and veterinary technicians are important for companion dog exercise as factors related to the health of companion dogs. This was the first work to study the awareness of owners regarding the healthcare of their companion dogs in Yongin-si. Furthermore, this study revealed that, although dog owners feel that their dogs are currently healthy, they tend to feel the need for more exercise and healthcare as their dogs become older and overweight. However, the exercise that owners can provide for their companion dogs is limited to walking, and as their city life prolongs, the living space of their dogs is mainly limited to indoors. We hope that comparing the companion animal healthcare and awareness between different regions within South Korea,

Table 4. Relationship between weight, height, age and amount of exercise

| Variable | Weight | Height | Age |
|--|-------------|--------------|--------------|
| The number of canine exercise per week | .075 (.380) | .083 (.332) | -.286 (.001) |
| Frequency of canine exercise per day | .029 (.733) | .153 (.074) | -.214 (.012) |
| Exercise time of canine per day | .024 (.048) | .042 (.628) | -.156 (.067) |
| Self-assessment of canine lack of exercise | .080 (.348) | -.083 (.333) | .225 (.008) |
| Need for canine exercise management | .120 (.159) | .073 (.399) | .101 (.904) |

as well as between Asia and the West, will help advance the field of companion animal study. And, this study highlights whether the efforts of dog owners or the role of animal physical therapists and veterinary technicians are important for companion dog exercise as factors related to the health of companion dogs.

Research on general health conditions of companion dogs

Obesity is the most common nutritional disorder exists in companion dogs and can significantly affect their health and lifespan.¹⁷ In this study, the number of responses dog owners believe the current health condition of their dogs as very healthy was 57 (40.7%), the highest number. The survey participants had companion dogs with a mean age of 6.21 ± 7.57 years, a mean height of 37.77 ± 15.39 cm, and a mean weight of 5.95 ± 4.63 kg. The number of participant responses with a total visit to the veterinary within the last 12 months was 48 (34.3%) for four visits and above, the highest number. The number of responses for disease types on companion dogs was 60 (42.9%) for none, the highest number.

Dog owners with average weight companion dogs have also participated in the survey. As the dog owners claimed that their dogs have no diseases, it is believed that these owners judged their dogs as being healthy. Furthermore, it is speculated that young companion dogs had the highest proportion of "four and over" veterinary visits due to vaccinations and "two visits" to the veterinary because of check-ups after vaccinations.

Research on the amount of exercise depending on the environment

According to a perception study of dog food consumers, a noticeably high proportion of companion dogs were raised in apartments compared to houses.^{1,13} The number of responses for the types of floor materials in the homes of dog owners was 61 (43.6%) for vinyl floors, the highest number. The number of responses for the main places of activity for companion dogs was 87 (62.1%) for house floor, the highest number. It is thought that the musculoskeletal system was the second most common response for the present disease type as higher urbanization results in more companion dogs residing in apartments. This limits their activities to apartment floors, where the most common type of floor material being as vinyl.

A study in South Korea reported that most dog owners only had one dog living in their homes.¹ Current research also confirms the majority of dog

owners had no additional animals with 97 (69.3%) responses. Thus, most of the owners were found to live with at least one dog.

Furthermore, most owners walk at least 10 minutes for the health of their dogs.²⁷ Moreover, compared to non-dog owners, dog owners walked for longer.²⁷ Thus, not only do companion dogs gain health improvements from the relationship with their owners, but the owners also benefit from their dogs. In this research, the most frequent healthcare routine was found to be walking with 99 (71.2%) responses. The high percentage of walking response was believed to be due to many companion dogs living and walking indoors, while massages are thought to be prevalent as it is a relatively easy task. The number of responses for the number of companion dog exercise (walking) per week are as follows: 42 respondents (30.0%) walked their dogs four or more times, the highest number. For the frequency of exercise per day for companion dogs, 76 (54.3%) respondents indicated one time, the highest number. For the exercise time of companion dogs per day, 50 (35.7%) participants indicated more than 40 minutes, the highest number. Most dog owners recognized the necessity of exercise for their companion dogs. Hence, it is thought that this was the reason for exercising their dogs once or twice per week. However, 15% of dog owners did not exercise their dogs at all, and 29.3% did not exercise their dogs per day, which we believe that the corresponding solutions should be followed. It is believed that the reason for the high proportion of exercise (walking) time over 40 minutes was due to long commute times to walking courses.

Companion dog activities in city parks have been sparking conflicts between park-goers.²² During exercising, the highest percentage of dog owners had their companion dogs wearing leashes. This was believed to be resulted from the societal pressures for dog owners to have their dogs wear leashes to minimize harm on others.

Research on dog owners' awareness of the necessity regarding the healthcare of their dogs

According to studies in South Korea, dog owners tend to underestimate the physical condition of their companion dogs. They may misinterpret their dogs as being obese, even when their physical conditions are good.¹ While some dog owners considered their companion dogs had enough exercise, others that thought their dogs lacked exercise, accounted for more than 40%. As the most common exercise for companion dogs was walking, it is unclear if some dog owners

mistook insufficient walking as a lack of exercise. The highest percentage of responses indicated that exercise management for companion dogs was crucial. This may be because the dog owners had a low frequency of exercise for their dogs and that many companion dogs mostly lived indoors. Hence, they would have believed their dogs relatively lacked exercise, so the owners thought they needed to manage their dogs to exercise more frequently.

Regarding the efforts that the dog owners can make to improve the health of their companion dogs, 55 (39.3%) respondents indicated regular exercise, 49 (35.0%) indicated food. The dog owners may know that they should allow their companion dogs to exercise more frequently; it is believed that their only realistic way was to walk their dogs more, with providing a better-quality diet being as the second option they could focus on.

In urban environments, spaces for companion dogs to exercise seem to be limited in parks.²² In this study, dog owners were questioned on the type of exercise their dogs needed; as a result, 82 (58.6%), respondents indicated cardiovascular exercise. It is assumed that some dog owners showed a high rate of response to cardiovascular exercise since such exercises, including walking, was the most common for dogs. Furthermore, it is assumed that the study outcome might stem from the human perspective²⁸ in which the activities of their companion dogs are mostly limited to indoors, with their physical activities being minimal, leading to the necessity of more activities for their health.

For the study results of correlation between the age, weight and height of companion dogs, as well as the amount of exercise and the necessity for health management, there existed no significant correlation between weight and height, as well as with those latter factors. However, the variable of weight seems to have a weak positive correlation with sub-question 15. The dog owners with heavier dogs responded that their dogs did a long workout per day. Meanwhile, age had a weak negative correlation with sub-question 14 and a weak positive correlation with sub-question 17. Therefore, although the correlation was found to be weak, dog owners tended to do less exercise, and they become more confident about their beliefs of their dogs lacking in exercise as they grow older.

Limitations

There exist some limitations in this research. First, it was limited to residents of Yongin-si, and the total number of survey participants was not representative

enough. Samples were collected based on healthcare awareness for companion dogs by region. As for another study about companion animals and diseases, Wonju-si was also included; the dog owners' awareness of oral healthcare in companion dogs from a dental hygienics perspective was researched.²⁹ Therefore, to improve the awareness of dog owners regarding canine health, this research mainly targeted owners in Youngin-si, Gyeonggi-do, leading to the limited number of survey participants. Unfortunately, it was rather difficult to achieve external validity because the activities of dogs and dog owners were carried out in various facilities (dog cafes, etc) instead of in parks. Gyeonggi-do is the first to operate a companion animal registration system, of which Yongin-si, Gyeonggi-do, has the highest animal registration rate in the country at 28.3%,²⁴ so a survey was conducted on dog owners living in Yongin-si, Gyeonggi-do. Second, in this study, the data outcomes were presented with frequencies and percentages. These outcomes suffer from a limitation in drawing conclusions, resulting in low levels of confidence. Thus, more causal analysis and understanding in awareness for companion dogs' healthcare should be carried out.

Clinical implications

While animal physiotherapy is being actively carried out in countries abroad, it is difficult to establish it because there are no policies or systems in South Korea yet.³⁰ However, due to the increasing demand and demand for animal physiotherapy education for physiotherapists,³¹ this study identified dog owners' awareness about health status for companion dogs and provided basic data on future animal physiotherapy.

CONCLUSION

The awareness regarding the healthcare of companion dogs was investigated for small-dog owners in Yongin-si. Results showed that even when companion dogs were currently healthy, their owners felt the need of their dogs to exercise and maintain their health as these dogs grow older and gain weight. Meanwhile, the exercise that owners can provide to their dogs is limited to walking. Furthermore, in urban life, the living space for companion dogs is restricted mainly to indoors. Based on this research, we believe that various environments become essential for companion dogs to exercise in an era of convergence.

Moreover, we consider that it is necessary to prepare a convergence industry and indoor fitness centers wherein dog owners can provide their companion dogs with well-ordered healthcare systems so that their pets can avoid the impacts of extreme climates, such as cold, heat, and yellow-dust.

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