原　著　麻布大学雑誌　第9・10巻　11 － 16

Effects of the Interaction with Dolphins on Physical and Mental conditions of the Elderly

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Abstract: The effects of animal-assisted therapy (AAT) on the physical and physiological health of old people have been well known. In general, dogs, cats and small animals have been used at the AAT for seniors. In this study we tried to clarify physical and mental effects of the interactions of old people and dolphins, with ten people aged from 50 to 60. The blood pressure and the heart rate were measured with a hemodynamometer before and after the activity with the dolphins. The psychological test was performed at the same time, using the Multiple Mood Scale. The results show that the positive emotions of the subjects were increased significantly, with concomitant decreases in the negative emotions. The means of the blood pressures were increased before approaching to dolphins and decreased gradually after the interaction with dolphins. These findings indicate that interactions with dolphins have a relaxed effect upon both mental and physical states of the participants in a short time.
Key words: dolphin-human interaction, blood pressure, Multiple Mood Scale (MMS)

Introduction

The health benefits for older people, associated with pet interactions, have been increasingly reported due to the increase in the aging population. The older people reduce connections with society and have negative connotations for some younger people. Elderly individuals also often have to make a greater effort to maintain their physical and mental health. Hart[1] has recommended the keeping of pets for elderly people. The pets provide social interactions and can confer an identity on an individual, reducing stress. It also is well known that dog owners exercise by walking far more regularly than non-owners[2], and that older individuals with pets have fewer medical visits, compared to non-owners[3].

A number of animal species such as dogs, cats, horses and dolphins, have been used in the animal-assisted therapy (AAT) and activity (AAA). Dogs and cats are the most commonly domesticated animals, are easy to breed and can therefore be adopted in therapeutic strategies for a wide range of people. These species have been extensively studied for their psychological effects in the AAT[4]. The horse is another animal that has been used to study the potential benefits, both mentally and physically, of AAT/AAA as they can promote functional recovery in patients who receive positive stimuli from the horse riding, which also promotes the balance[5]. On the other hand, there are few studies of the effects of dolphin-assisted therapy or of the potential benefits of human-dolphin interactions[6].

The dolphin-assisted therapy (DAT) has been employed for about 20 years to assist mentally and physically handicapped people. Smith[7-9] is a pioneer of the DAT, and has found that there were differences in how dolphins respond to people with mental handicaps and to healthy people. She initiated the DAT studies for people with mental and physical developmental disorders in Florida in 1978. She has reported that there were favorable effects on the behavior, emotion and language development of

autistic children following the DAT. These effects manifested themselves as a greater number of eye contacts, greater vocalization with other people, allowing people to get physically nearer, a display of appropriate and responsible behavior to the dolphin, a reduce of behavioral problems and an increase in their ability of attentions. The interactions between autistic child and dolphin also allow them a greater freedom of activity than the physical or occupational therapies. Recently Nathanson [10] has shown that children with mental disabilities made higher verbal response levels, interacting with dolphins in reward based therapy sessions. In his another studies [11, 12], children with the mental disorders of varying degrees of severity had motor and voluntary language skills reached the therapeutic goal in a 2-week of the DAT program. It was also considerably less expensive in the 2-week DAT than 6 months of conventional therapies.

There are great deals of benefit by owning a pet animal, but all people are not in a position to keep a pet. Especially the elderly tend to be not positive to have animals because of their difficulty in taking care of pets, such as dogs and cats. Some seniors who have previously kept animals do not wish to own another due to the reduction in visual as well as physical functions. Furthermore, their living environments are too small to have pets and rental properties in Japan which often prohibit keeping animals.

On the other hand, a dolphin is an unusual animal for most people, therefore it motivates for the elderly, e.g., they want to go to see, touch and converse with it. They will go out positively.

In August of 2003, two dolphins were moved to the Muroto Cape, to study the dolphin-human interaction. This study focuses attention on mental and physiological effects of the interactions between the dolphin and old people, and discusses the availability of activities with the dolphins.

Materials and Methods

1) Subjects

The study group consisted of 10 people (5 male, 5 female) aged between 50 and 60 years. They are living near the facility housing the dolphins at Muroto Cape, Kouchi.

2) Dolphins

This study was conducted using two captive bottlenose dolphins (*Tursiops truncatus*). The dolphins were about 5 years of age, and their approximate body sizes were 250 cm in length and 200 kg in weight. They were held in sea pen (20 m × 40 m, 8 m in depth) separated from the open sea by a breakwater. On August 6, 2003, they were moved to Muroto Cape, Kouchi, from Taiji, Wakayama and have been training here for four months. The activities that people touched and fed the dolphins and dolphin therapy programs were held in summer. The dolphins had been trained to interact and swim with humans for about four years at a facility in Wakayama.

3) Procedure

The samples for the 10 participants were collected in December of 2003. During the study the weather was fine and the sea was calm every day. Subjects participated one time in the activity that they watched, touched and fed the dolphins for 15 minutes. In all the session, each subject was accompanied with a staff. Before and after these activities, the participants had their blood pressure and heart rate measured, and completed the psychological questionnaire.

4) Measurement of blood pressure and heart rate

The blood pressure and the heart rate of the subjects were determined by wrist hemadynamometers (boso-medilife, BOSCH+SOHN GMBH U. CO., Jungingen, Germany) which could record the data quickly and easily. Each participant placed the instrument on the left wrist and stayed it near the heart for one minute. The measurements were five times each, i.e., "before (control)", "just before", "just after", "5 minutes after" and "10 minutes after" the activities. The mean arterial pressure (MAP) was calculated from the systolic (SYS) and diastolic (DIA) blood pressure [MAP = (SYS – DIA)/3+SYS].

Disposition of the study participants at each timepoint for blood pressure measurements:

① Before (Control)... remained in a waiting room or viewed dolphins only from a distance

② Just before... just prior to boarding a float

③ Just after... just after the 15 minutes session with the

dolphins

④ After 5 minutes... after the 15 minutes session but still viewing the dolphins at a distance

⑤ After 10 minutes... after the 15 minutes session but still viewing the dolphins at a distance or staying at the waiting room

5) Psychological questionnaire – Multiple Mood Scale (MMS)

Multiple Mood Scale (MMS) was utilized to measure the mood levels of the subjects both before and after the activities with the dolphins. Many different scales have been developed to measure multiple mood states and these have been applied widely to measure the effects of drugs, psychotherapies and artwork (Howarth & Schokman-Gates, 1981) [13]. Popular scales include the Nowlis Mood Adjective Checklist (MACL; Nowlis & Green, 1965), the Multiple Affect Adjective Checklist (MAACL; Zuckerman & Lubin, 1965), the Profile of Moods States (POMS; McNair *et al.*, 1971), and the Positive Affect-Negative Affect Schedule (PANAS; Watson *et al.*, 1988). The MMS system used by in this study was designed by Terasaki[14] in 1992, specifically to measure the mood states of Japanese subjects using Japanese adjectives or other similar words. This method evaluates the multiple moods (Depression, Hostility, Boredom, Liveliness, Well Being, Friendliness, Concentration and Startle) on a scale of one to four (1: barely 2: slight 3: a little 4: most).

6) Statistics

All the data were analyzed by the ANOVA and the student's t-test, to assess statistically significance.

Results

The blood pressures were increased to reach maximum levels (SYS: mean ± S.E. = 142.7 ± 4.7 mmHg, DIA: 103.8 ± 5.1mmHg, MAP: 120.5 ± 4.0 mmHg) just before the activities with the dolphins and, decreased to reach minimum levels (SYS: 135.0 ± 3.7 mmHg, DIA: 89.4 ± 2.9 mmHg, MAP: 104.8 ± 3.9 mmHg) after about 10 minutes [Fig. 1]. The pulse rates (PUL) were also increased gradually to reach a maximum level just before the session (78.1 ± 3.8 times/min) and decreased to minimum levels (72.9 ± 2.2 times/min) after 5 minutes. There are statistically significant differences ($p<0.05$) in the variation of DIA and MAP levels, but no significant difference were found after the session. It was also found that the male subjects showed some decreases in these parameters after the experience [Fig. 2].

Four parameters, "Liveliness", "Well-Being", "Friendliness" and "Startle" showed statistically significant post-activity increases ($p<0.05$) in each of the subjects, whereas negative moods such as "Depression", "Hostility" and "Boredom" were found to decrease [Fig. 3].

Discussion

In this study involving the DAT-type sessions, it was found that the blood pressure levels and the heart rates of the participants tended to increase prior to the activity, but to show measurable decreases afterwards. The subjects were required to board a raft and to physically touch the dolphins. Viewing the dolphins close up from this raft has been found to encourage people, particularly in cases where individuals exhibit nervousness, to more readily interact with them. From this vantage point, participants could witness more easily the bodily features and dynamic behavior of the dolphins, which resulted in higher levels of enjoyment and excitement. The subjects did not show an increase in blood pressure after a 15 minute interactive session with the dolphins. This clearly indicates that they did not experience any stress following these interactions and indeed there was ample evidence that all the participants enjoyed the session and displayed positive feelings towards the endeavor.

Assessment of the mental state of the subjects showed significant increases in positive emotions and concomitant decreases in negative emotions, after the activity. The increase in the "startle" emotion seemed to be due to the interaction with the dolphins and to be much different from that with other animals like dogs and cats.

Dolphins have different physical shapes from terrestrial

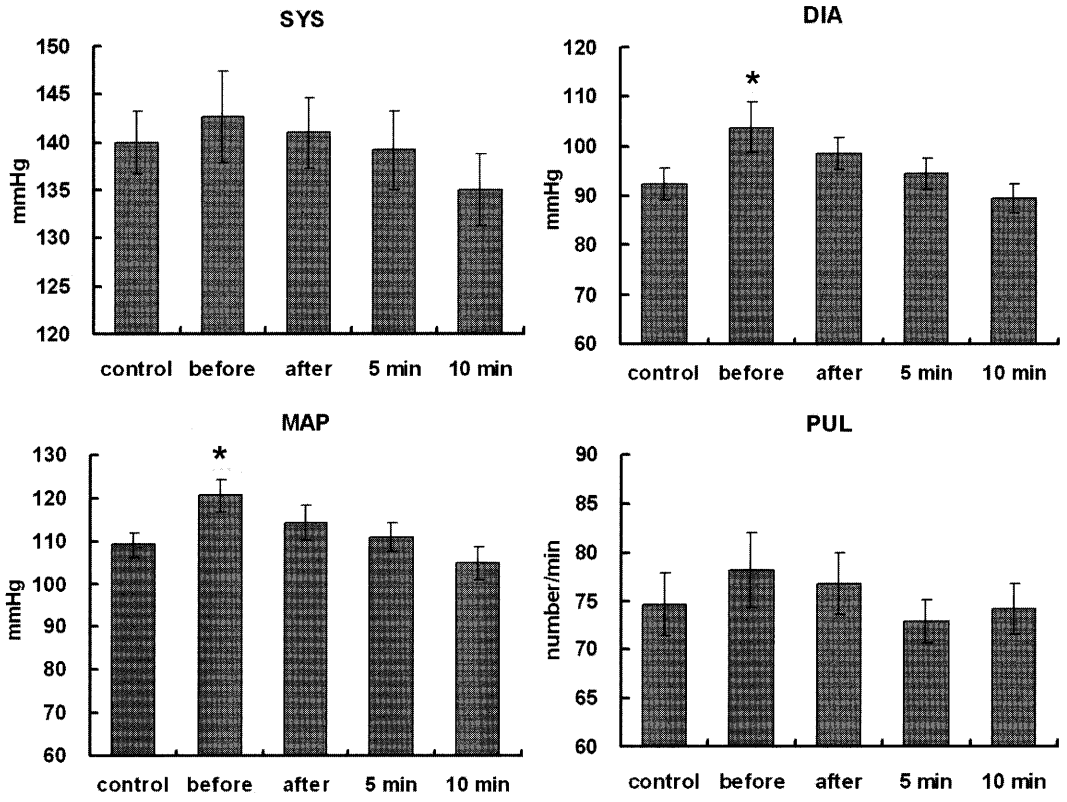

Fig. 1 Means of systolic (SYS) and diastolic (DIA) blood pressure levels, mean arterial pressure levels (MAP), and pulse rates (PUL) in 10 subjects. There are significant increases in the variation of DIA and MAP levels before the activities with the dolphins as compared to the control (*p<0.05).

animals and are not commonly seen by people, and thus must give some excitement and enjoyment. Most individuals seemed to be very pleasurable in the interaction with dolphins. One participant, who had expressed a real fear of dogs, stated that they had no such concerns with the dolphins.

In this study one subject, who has come this place everyday, remarked that her physical condition including blood pressure levels had been improved. Her dietary condition has also been improved since she has met the dolphins. There was a subject who hardly had ever smiled, but he said to want to see the dolphins again with smile.

It is often difficult for the elderly to take care of pet animals, although they have liked them. Indeed, 9 of 10 subjects kept pet animals in the past, but only 2 participants have continued to do so. One of the participants who had previously kept a dog expressed an anxiety that an animal would be left alone upon her death and therefore she was reluctant to obtain a pet again. The interaction with dolphins may be suitable for these people, and may have a distinguish role in physical, psychological and social effect.

Nathanson's studies suggest that the dolphin-human interaction results the great effect in a short period and considerably less expensive. People who had met the dolphins in this study were relaxed and friendly in a short time. It indicated that the visualization of a dolphin in itself and this activity was enjoyable and exciting. Most seniors can't have an active exercise and maintain to do routine job. It is much important for seniors to have pleasure easily at anytime they want. The interaction with dolphins is useful for the maintenance of physical and mental health of the elderly.

Acknowledgement

We thank Dr. Dennis C. Turner, the director of I.E.A.P./

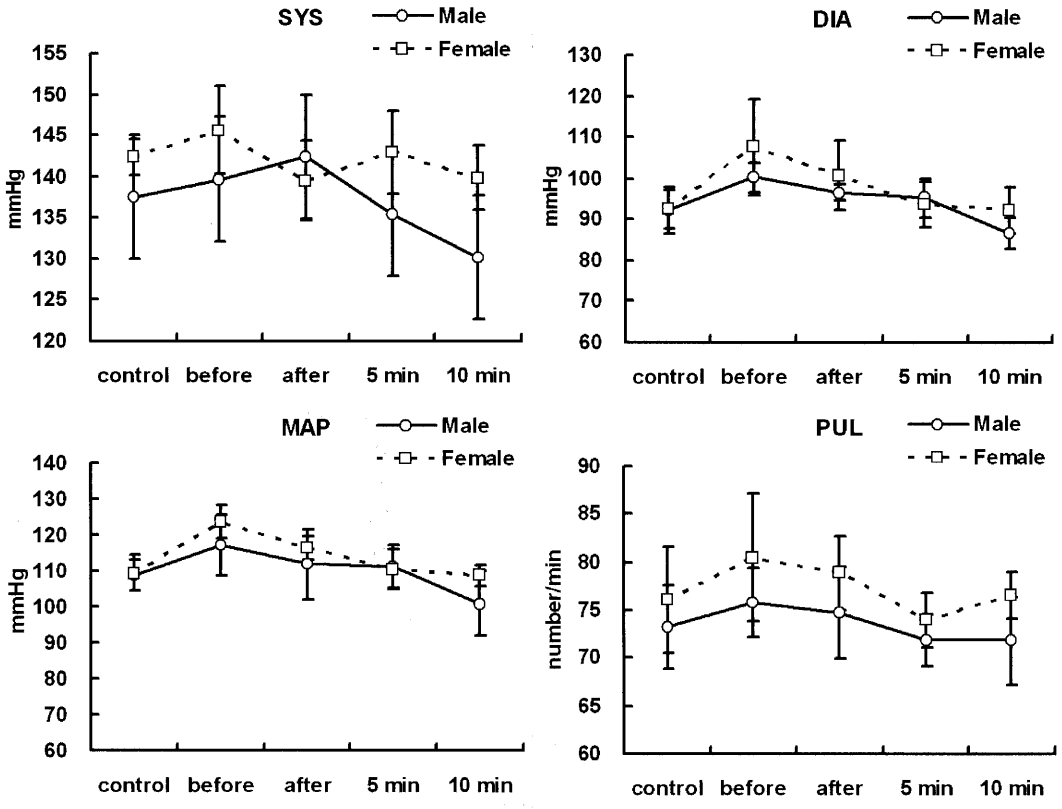

Fig. 2 Means of systolic (SYS) and diastolic (DIA) blood pressure levels, mean arterial pressure levels (MAP), and pulse rates (PUL) in male and female participants

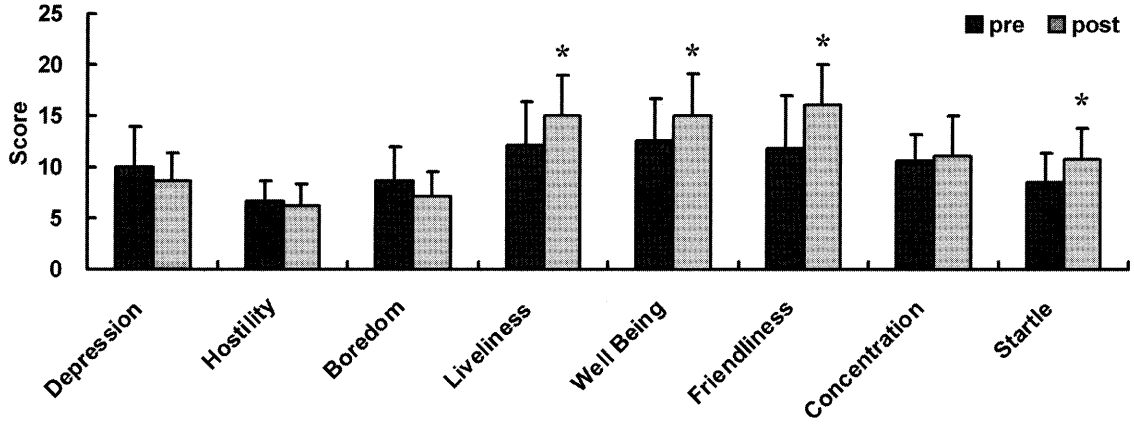

Fig. 3 Means of scores of the Multiple Mood Scale in 10 subjects. Four parameters (Liveliness, Well Being, Friendliness, Startle) showed statistically significant increases after the interaction with dolphins (Post) (*p<0.05).

I.E.T and my colleagues of Dolphin Team in my laboratory. Many thanks also go to many people at Muroto, Kochi, who contributed to this research.

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