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The Effects of Animal Assisted Therapy Applications on Salivary Cortisol

Nazmiye Gunes[1*], Turel Ozkul[2], Kamil Seyrek Intas[3], Sercan Koray Yendim[4] and Kemal Yilmaz[5]

[1]Department of Biochemistry, Faculty of Veterinary Medicine, Uludag University, TR-16059, Bursa-Turkey
[2]Department of History of Veterinay Medicine and Deontology, Faculty of Veterinary Medicine, Uludag University, TR-16059, Bursa-Turkey
[3]Department of Obstetrics and Gynecology, Faculty of Veterinary Medicine, Uludag University, TR-16059, Bursa-Turkey
[4,5]Vocational School of Mennan Pasinli, Uludag University, TR-16059, Bursa-Turkey

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ABSTRACT This pilot study for Turkey consisted of two parts. In the first part of the study Animal Assisted Therapy (AAT) team visited nursing home residents once a week for six weeks. In the second part of the study, children with mental retardation visited the Uludag University Veterinary Faculty Farm once a week for six weeks and cooperated with AAT team. Salivary samples were taken before and after the 15 minute AAT sessions from participants. According to the results of this study except the last week of elderly group ($p<0.05$), there is no statistically significant change in both parts but it can be said that AAT applications decrease the stress levels of older adults and children with mental retardation and more research is needed in this area with large sample size.

INTRODUCTION

During the twentieth century the proportion of older persons continued to rise and this trend is expected to continue into the twenty-first century. For example, the proportion of older persons was eight percent in 1950 and ten percent in 2000, and is projected to reach twenty-one percent in 2050. Such rapid growth will require far-reaching economic, social and health adjustments in most countries (Anonymous 2014a). Over the last two decades, the percentage of elderly persons in Turkey in relation with the rest of the world has increased. The considerable growth in the elderly population in Turkey has brought with it problems as well as concerns and represent a major challenge in setting new policies regarding these persons and their needs. Researchers have begun to recognize the importance of the human-animal bond for older adults (Anonymous 2013). This has led to a rise in the number of programs that use animals to improve the lives of nursing home residents. Pet attachment was found to be related to decreased levels of depressive symptoms among older adults. Researchers have begun to recognize the relaxing effect of pet attachment for older adults (Cherniack and Cherniack 2014; Ludqvist et al. 2017).

On the other hand there are 1 million 100 thousand disabled children between the age of 4-18 in Turkey. Forty-five thousand of them have vision, 130 thousand of them have hearing, 500 thousand of them have mentally, 300 thousand of them have moving disablity. The education and social support for these children is insufficient (Anonymous 2014b) .

Equine therapy is being used on a global scale with 650 centers in the United States to treat children with an array of disabilities (Lane 2007). In addition to the physical benefits of equine therapy, there are also social emotional and cognitive benefits that have been observed with increased self-esteem, confidence, and communication (Meregillano 2004). Mental retardation is also one of the areas of application of equine therapy. There are studies (Nepps et al. 2011; Yorke et al. 2013; Viau et al. 2010; Berry et al. 2012) focused on measurement of the AAT

[*]*Address for correspondence:*
Nazmiye Gunes
Uludag University,
Faculty of Veterinary Medicine,
Department of Biochemistry
Telephone: +90 224 2941282,
Fax: +90 224 2941202,
E-mail: ngunes@uludag.edu.tr

effects on different groups by using saliva cortisol.

Cortisol is a glucocorticoid hormone, an important hormone secreted from the adrenal cortex. It is known that cortisol production has a circadian rhythm. Blood cortisol levels are the highest in the morning and evening is the lowest. Cortisol levels are also an indicator of the hypothalamic-pituitary-adrenal axis in living organisim. Cortisol hormone activates the immun system of the living organism against external adverse effects as a stress. It affects carbohydrate, lipid, protein metabolisms, nervous system, lymphoid tissues and kidneys. It elevates blood glucose, stimulates lipolysis, causes protein catabolism (Chernow 1987; Migeon and Lanes 1990; Fischbach 1992; Dorn et al. 2007). For these reasons, it is very important that the level of cortisol in organism to be kept at a certain limit. Based on this information, this hormone level is measured as an indicator of the stress conditions. However, taking blood to measure serum cortisol levels is a source of stress in life. Instead, cortisol levels are measured in saliva samples in recent years (Kalman and Grahn 2004). Studies have indicated that salivary cortisol levels reflect serum cortisol levels (Vining et al.1983; Yates et al. 2010).

The cortisol level is independent of the circadian rhythm in case of stress (Kreiger 1975). Only one-fifteen percent of the cortisol level in the blood is biologically active. Other part of cortisol is bound to serum proteins about eighty-five percent. Unbound serum cortisol enters the saliva via intracellular mechanisms (Vining et al.1983; Vining and McGinley 1987).

This is the first study to evaluate the effect of AAT practices on salivary cortisol levels in Turkey. The purpose of this study was to test the effectiveness of AAT in nursing home residents and children with mental retardation by using stress indicator cortizol and to lead and provide data for similar future studies.

MATERIAL AND METHODS

Study has originated from the Project named "Applications of Animal Assisted Therapies for Elderly People and Children" supported from Uludag University and Bursa Metropolitan Municipality Cooperation Protocol. 29.09.2010 (118371). Study consisted of two parts and conducted in Bursa Metropolitan Municipality Nursing Home and Uludag University Veterinary Faculty Farm. This study was approved by Uludag Clinical Research Ethics Committee of Uludag University School of Medicine (Dog Therapy 22 March 2011; Equine Therapy 28 August 2012), Bursa National Education Directorate and Bursa Governorship (2 October 2012 (44584). The informed consent of the participants were obtained.

In the first part of the study, AAT team (5-year-old female golden retriever and owner) visited nursing home residents once a week for six weeks. Salivary samples were taken before and after the 15 minute AAT sessions from participants (group size ranged weekly between 11 and 5) and control group. In the second part of the study, children with mental retardation aged 6-10 visited the Uludag University Veterinary Faculty Farm once a week for six weeks and cooperated with AAT team (10-15 years old horses and 4 adaptive therapeutic riding specialists). Salivary samples were taken before and after the 20 minutes AAT sessions from participants (group size ranged weekly between 10 and 7) and control group.

Saliva was collected by oral care bar. Participants chewed this bar and then spit into a centrifuge tube. Tubes were centrifuged at 3000 rpm for 15 minutes and then bars were removed from the tubes and tubes were stored at -20 to-80C until the day of analysis. After collecting all samples, cortisol levels were evaluated by Salivary Cortizol Eliza Kit (Demeditec, Germany) .

Nonparametric Two-related-samples tests and Wilcoxon test was used for comparisons between the pre and post measurement groups. All statistical analyses were performed using SPSS statistical program (Edition 22.0 SPSS Inc. Chicago IL, USA). All data are expressed as mean ± SE. A value of $P<0.05$ was considered significant.

RESULTS

In the first part of the study saliva samples were taken from nursing home residents once a week for six weeks. Participants were sitting on the chairs lined crescent-shaped to see each other when playing and petting the therapy dog. Saliva samples were collected before and after the 15 minutes therapy sessions. Saliva cortizol group mean results were listed and showed in Table 1.

According to these results, in the part of the work done in the nursing home, the before val-

Table 1: Nursing home saliva cortisol (ng/ml) results

Sample	*N*	*Minimum*	*Maximum*	*Mean ± S.E*
1. Week 1	11	1.327	7.289	3.094 ± 0.521
1. Week 2	10	1.251	5.948	2.923 ± 0.473
2. Week 1	8	1.353	5.834	2.703 ± 0.494
2. Week 2	10	0.703	5.406	2.308 ± 0.424
3. Week 1	6	1.128	3.180	2.128 ± 0.282
3. Week 2	6	1.138	3.665	2.234 ± 0.467
4. Week 1	6	0.773	2.054	1.345 ± 0.191
4. Week 2	6	0.384	2.651	1.224 ± 0.322
5. Week 1	8	1.317	2.441	1.874 ± 0.160
5. Week 2	8	1.167	2.434	1.581 ± 0.137
6. Week 1	5	2.267	3.104	2.557 ± 0.164*
6. Week 2	5	2.098	2.705	2.358 ± 0.117*
Control 1	5	2.631	5.581	3.448 ± 0.547
Control 2	5	2.683	5.566	3.442 ± 0.540

* P<0.05

ues for the therapy for 6 weeks were found to be respectively 3.094, 2.703, 2.128, 1.345, 1.874, 2.557 and the values after therapy were again found to be 2.923, 2.308, 2.234, 1.124, 1.581, 2.358 (Table 1). There was no statistically significant difference between the values before and after therapy until the last week. However, at week six, p <0.05 was considered significant between pre- and post-therapy values.

In the second part of the study; children with mental retardation aged 6-10 visited the Farm of the Uludag University Veterinary Faculty and their adaptation period completed. This period involved the observing and touching (petting) the horses. After the adaptation period participants visited the farm once a week for six weeks. During the sessions 3 adaptive therapeutic riding specialists led the horses with the help of 6 co-partners supporting children from the sides and one experienced specialist controlled the groups from the middle of the circle. Saliva samples were collected from the participants before and after the 15 minutes therapy sesssions. Saliva cortizol group mean results were listed and showed in Table 2.

In this part of the study, the values before therapy with horses for six weeks were found to be 5.22, 4.88, 4.35, 2.88, 3.10, 2.54 respectively, and after therapy values were found to be again 4.18, 4.11, 3.81, 2.44, 2.46, 2.09. There was no statistical significance between the values before and after therapy with horses for six weeks. However, when the salivary cortisol values obtained in all weeks are examined, it is seen that all of the post-therapy values are lower than the pre-therapy values.

DISCUSSION

According to the results of nursing home participants: except one week group mean cortizol levels in samples taken after the sessions

Table 2: Equine theraphy saliva cortisol (ng/ml) results

Sample	*N*	*Minimum*	*Maximum*	*Mean ± S.E*
1. Week 1	10	2.097	9.580	5.22 ± 0.948
1. Week 2	9	1.172	9.952	4.18 ± 0.918
2. Week 1	9	1.936	9.306	4.88 ± 0.919
2. Week 2	8	1.407	7.320	4.11 ± 0.777
3. Week 1	9	2.067	7.808	4.35 ± 0.583
3. Week 2	10	1.662	6.484	3.81 ± 0.629
4. Week 1	8	1.083	4.388	2.88 ± 0.384
4. Week 2	8	1.052	3.833	2.44 ± 0.343
5. Week 1	7	1.245	6.484	3.10 ± 0.681
5. Week 2	8	1.502	3.820	2.46 ± 0.340
6. Week 1	8	1.131	4.876	2.54 ± 0.469
6. Week 2	8	1.101	4.253	2.09 ± 0.460
Control 1	5	1.587	2.002	1.84 ± 0.128
Control 2	5	1.684	1.989	1.87 ± 0.093

was lower than predecessors and control group. There were significant changes recorded ($p<0.05$) for the last week (Table 1).

The results of the study are consistent with the findings of Lundqvist et al.'s (2017) research who analyzed the results of scientific studies conducted in nursing homes or home care settings. This review indicated that dog-assisted support had positive effects on stress and mood but statistical significance was not achieved in the majority of the assessed articles.

There were no statistically significant changes in the cortizol measurement results of the children before and and after equine therapy sessions but group mean cortizol levels in samples taken after the sessions was lower than predecessors and control group for all weeks (Table 2). These results are consistent with the study of Karlene et al.'s (2016). After conducting a meta-analysis of seven studies in which the effects of equine therapies on youth were examined they emphasized that the therapies for youth at risk were moderately effective.

According to the results of this study it can be said that AAT applications decrease the stress levels of older adults in nursing home residents and children with mental retardation. The results of this study support the hypothesis that AAT can reduce the stress and anxiety levels and the results are consistent with the findings of the other studies (Lundqvist et al. 2017; Nepps et al. 2011; Cole et al. 2007; Barker and Dawson 1998; Kruger et al. 2004).

CONCLUSION

It should planned to work longer with a larger sample size so that statistically significant results can be obtained from this and similar studies which demonstrate the positive effect of therapies made with dogs and horses on stress.

RECOMMENDATIONS

Cooperation and willingness of the participants- both individuals and institutions- in this study can be considered encouraging for application of similar therapies in Turkey to older adults in nursing homes and mentally challenged children as a form of social support. The increase in scientific studies to be conducted in this area is important for the spread of this support.

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