

## Effect of classic massage therapy on the heart rate of horses working in hippotherapy. Case study

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**Abstract:** *Effect of classic massage therapy on the heart rate of horses working in hippotherapy. Case study.* The objective of this study was to determine the effect of classical massage therapy on heart rate in horses working in hippotherapy. We hypothesised that massage can be used to improve the horse's welfare, because it mentally relaxes the horse. The relationship between variables were examined to determine whether the selected factors (use or non-use of massage, the method of securing the patient on the horse, way of getting on a horse, place of treatment) influenced the heart rate of two horses working in hippotherapy. The results showed significant but very different effects on heart rate of particular horses subjected to a massage. It was also shown that heart rate of horses working in hippotherapy is highly influenced by environmental factors.

*Key words:* massage, horses, hippotherapy

### INTRODUCTION

Massage is defined as the systematic therapeutic stroking or kneading of the body or one of its parts (Blood and Studert 1999). It has a wide spectrum of effects. It allows to relieve the body from pain and stress, reduces pressure, helps to achieve relaxation. Massage is currently widely used in veterinary physiotherapy for both its physiological and psychological effects (Valberg 1996, Roetting 1999). Horses have a very large muscle mass compared to their body structure. Massage is a manual therapy that can be

used therapeutically to reduce muscle tone, restore muscle flexibility, improve joint range of motion and, as a result, has the potential to improve the horse's locomotor function. Thus it allows the horse to move and perform in its full movement potential. Hill and Crook (2010) explore the effects of massage to the caudal muscles (retractors) of the equine hindlimb on active and passive limb protraction and stride length and found that massage significantly increased passive ( $P = 0.01$ ) and active limb ( $P = 0.01$ ) protraction. In human patients massage therapy reduces feelings of anxiety and improves self-esteem (Hernandez-Reif et al. 1998). It is likely emotions also play an important role in the horse, particularly with respect to his work. The horse may not function optimally unless it is psychologically comfortable and confident (Denoix and Pailloux 1996) and massage may be able to promote this feeling of well-being in work. This study is one of the first attempt to utilise objective outcome measures to determine the effectiveness of classical massage on welfare of hippotherapy horses.

The objective of this study was to determine the effect of classical massage therapy on heart rate of horses working in hippotherapy. We hypothesised that massage have positive psychological effect on hippotherapy horses reducing their

heart rate and mentally relaxing horse, and may therefore play a valuable role in the development of strategies used to improve a horse's welfare.

## MATERIAL AND METHODS

The research was carried out in the facility for blind and low-vision people in Laski, Poland, where hippotherapeutic activities for pre-school and school children are organized. The facility in Laski has been under the patronage of the Polish Hippotherapeutic Association since 2006.

The subjects comprised two geldings with different records in hippotherapy work:

- Horse A: hucul, 15 years old, withers height 138 cm, calm and composed; working for 9 years as hippotherapy horse.
- Horse B: fjord, 13 years old, withers height 130 cm, lazy but courageous; working for 2 years as hippotherapy horse.

All horses were in regular work in hippotherapy and identically managed at the same hippotherapy center. Both geldings received the massage treatment. We attempted to ensure that the experimental conditions were the same for both horses. The intention was to minimize any physical or emotional stress in the subjects, which may have affected the results of heart rate measurements.

The trait under examination in the horses was the heart rate measured by the constant heart rate monitor (beats per minute – bpm). The analysis of this feature is usually applied in research on changes in the balance of the sympath-

etic nervous system and the vagus nerve connected to disorders, in research on psychological and environmental stressors (Rietmann et al. 2004, Łojek and Poszepczyńska 2006), behavioural disfunctions (Bachmann et al. 2003), training methods or for individual evaluation of the animals for temperament (Visser et al. 2002), emotional status and the strategies of coping with environmental conditions.

The examination of the heart beat was carried out with the Heart Rate Monitor model S 810 manufactured by POLAR ELECTRO OY. The analysis and correction at the level of 6.0 (average level of correction) was performed with Polar Precision Performance for Windows which allows to record and analyze the data in graphical form.

The research lasted from the end of April till the end of June 2012, during hippotherapeutic activities with children at pre-school age with various degrees of vision disability. Heart rate of both horses was measured during their participation in the hippotherapeutic activities during the following periods:

- in the last week of April, when the horses were not massaged,
- in May, when the horses were massaged,
- in the first two weeks of June, when the horses were massaged.

The organization of the research comprised the following procedures:

- from 8:30 a.m. to about 9:40 a.m. the horses were groomed and consequently taken for a ride in the countryside;
- after returning the horses had some rest and subsequently they started activities with children at the pre-

- school, which lasted from 10:15 a.m. to 12 a.m. During these activities the heart rate was measured;
- After returning from the therapy around 12 a.m. the first horse was let out on a paddock and the second one was massaged for about 1 hour. Then the horses were changed.

The heart rate measurements (bpm) of both horses working in hippotherapy were taken with reference to the conditions of the conducted therapy. In the analyses the SPSS Statistical Package ver. 19.0 (2012) was used. The four chosen factors of the analysis were as follows:

1. Month of therapy – so the use or non-use of massage:
  - April – no massage applied,
  - May – massage applied,
  - the first two weeks of June – massage applied.
2. The method of securing the patient on the horse:
  - from the horseback,
  - from the ground.
3. The method of mounting the horse:
  - from a ramp,
  - from the ground.
4. The place where the therapy were conducted:
  - in the forest,
  - in the lime-tree alley.

The data were checked for normality of distribution with Kolmogorov–Smirnov Test (K-S test) for one sample. Due to the fact, that the value of the test probability turned out to be lower than the accepted level of significance ( $P \leq 0.05$ ) the hypothesis that the analysed distribution is identical with normal distribution was rejected. Logarithmic transformation of

the data did not result in normalization of the distribution.

The Pearson Chi-square test and the precise Fischer tests were used to examine the interdependence between the features in order to decide whether the chosen factors resulted in the change in heartrate of the two horses working in hippotherapy.

The small sample size limited our statistical analysis to nonparametric tests: Kruskal–Wallis test and Mann–Whitney U test.

## RESULTS AND DISCUSSION

One of the most important and most popular types of massage is the classical massage. Depending on its intensity it can be healing, stimulating or relaxing. Massage is a common method for “wellness” purposes, its efficacy for several indications is still under debate. The psychological effects of massage in humans are well documented (Hernandez-Reif et al. 1998, Hemmings et al. 2000). However, effects on behavior or stress parameters described for man (Hemmings 2001, Moyer et al. 2004) have been found also in horses, where grooming or massage reduced heart rate and caused positive behavioral responses, when performed on preferred sites of allogrooming (Feh and de Mazieres 1993, McBride et al. 2004).

This study demonstrates that massage of the horses had significant influence on their heart rate during hippotherapy. The results of the Kruskal–Wallis test allowed to reject the null hypothesis on lack of influence of massage on the heart rate in both horses used for hippo-

therapy. The results of the Mann–Whitney U test showed significant differences ( $P \leq 0.01$ ) between the heart rates depending on the month when the therapy was performed (and thus on applying or not applying massage), the method of securing the patient on the horse, the method of getting on the horse and the place of therapy (Table 1).

The results indicate significant differences between the horses. This is shown by the total average heart rate of Horse A (56.2 bpm) and Horse B (43.5 bpm), as well as the horses individual reaction to the conditions of conducting of the therapy, including applying massage (Table 1). In the case of Horse A, no relaxing effect of massage on the heart beat during hippotherapeutic activities with children was observed. In April the heart rate of this horse was low-

est, in May, when massage was applied throughout the month, it clearly increased (Table 1 – The month of conducting therapy). The heart rate decreased slightly in June – the month when massage was applied only for the first two weeks. Different reaction to applying massage as a relaxing factor was observed in Horse B. The horse's heart rate significantly decreased in May compared to April. This tendency continued in June, when the horse was massaged only for half of the month. This could result from the individual preferences of the horses, as far as the sense of touch is concerned, although Horse A has never showed negative reaction to touch (e.g. during grooming), but the research shows that the horse's heart rate increased as a result of massaging. The horses' reaction to massage indicates, that different horses may react

TABLE 1. The results of the analysis of the heart rate (bpm) of two horses working in hippotherapy depending on factors connected with the conditions of the conducted therapy

Factors	Horse A				Horse B			
	<i>n</i>	<i>x</i>	SEM	P	<i>n</i>	<i>x</i>	SEM	P
Month of therapy (use or non-use of massage)								
April – no massage applied	953	41.2	0.289	<0.001	1273	53.2	0.535	<0.001
May – massage applied	1963	62.8	0.197		1057	35.9	0.151	
June – massage applied	649	58.5	0.198		585	35.8	0.179	
Method of securing the patient on the horse								
From the horseback	726	65.1	0.335	<0.001	585	35.8	0.179	<0.001
From the ground	2839	54.0	0.227		2330	45.4	0.349	
Method of mounting the horse								
From a ramp	2842	54.0	0.226	<0.001	1198	37.8	0.257	<0.001
From the ground	723	65.1	0.336		1717	47.4	0.435	
The place where the therapy were conducted								
Forest	1015	53.3	0.469	<0.001	1056	35.4	0.129	<0.001
Lime-tree alley	2550	57.4	0.217		1859	48.1	0.413	
Total	3565	56.2	0.207		2915	43.5	0.290	

The level of significance assumed as highly significant:  $P \leq 0.01$ ; SEM – standard error of the mean.

differently to this procedure. It should be pointed out that the massage does not always cause the positive result. Massage increases endorphin release, which may explain the reported sensation of well-being post massage (Kaada and Torsteimbo 1987). Massage may also have had a beneficial psychological effect on the horses used in this study, aiding relaxation and improving their sense of well-being.

Both horses reacted differently to the method of securing the patient (Table 1). Horse A reacted with increasing heart rate in the case of securing from the horse's back and Horse B showed the same increase in heart rate while securing the patient from the ground. This may be due to the fact, that Horse B was working as hippotherapy horse for only 2 years and may not be accustomed to the securing person, walking at his side. Moreover, the presence of two people – the person leading the horse and the person securing the patient – may have caused his anxiety. On the other hand, Horse A has been used in hippotherapy for a long time and has already been accustomed to greater number of persons around him during the therapy. It must be also taken into consideration, that the activities with securing the patient from the horseback have been conducted very rarely and this method of securing the patient might have been something unexpected for the horse, thus causing his heart rate to rise.

The reactions of both horses to the method of mounting and the location of performing the therapeutic activities were similar. The method of putting the patient on the horse depends on the type of illness and its advancement. Introduc-

tion of this factor into the research aimed at defining, whether the moment of putting the patient on the horse is perceptible for the animal. Horses were more tolerant to mounting from a ramp rather than from the ground (Table 1) which can be explained by the fact, that mounting from a ramp is definitely less strenuous for the horse's back and is more comfortable for the animal. The average heart rates measured at this method of mounting were lower than the total average of horses A and B. This could also be due to the fact that the horse waited a while for the patient while standing near the ramp and only then was he starting the work. When mounting from the ground, the work started immediately.

Lower average heart rates were recorded in both horses during work in the forest compared to the lime-tree alley (Table 1). This result may be contributed to fact, that the forest is a much calmer environment for work. It is a natural environment, isolated from external influences and from wind. The conditions of work in the lime-tree alley were totally different. Very often strong wind occurred, and on adjacent areas field works were carried out, which was connected with noise from the tractors and other machines. Both the results of this study, and results of studies performed by other Authors indicate, that the environment plays a crucial role in conducting hippotherapy, which directly influences the main condition of successful therapy – the patient's safety.

The results of our work should be viewed as a preliminary insight into the effectiveness of classical massage on heart rate of horses working in hippotherapy. It is recommended that further

experiments be undertaken using a large number of animals to confirm the findings of this work.

## CONCLUSIONS

1. Significant influence of massage on the heart rate during the hippotherapeutic activities was observed.
2. The reaction of the horses to massage indicates, that different horses may have a totally different reaction to this procedure and one has to bear in mind that this procedure will not bring the expected result in any case.
3. A crucial role of the environmental conditions of therapy was demonstrated. The conditions of conducting the therapy, i.e. the method of securing the patient, the method of mounting the horse and the location of the therapeutic activities had a significant influence on the heart rates of the horses at work.
4. The highly significant individual differences between horses in terms of their reaction to the same conditions of conducting the therapy emphasize the importance of proper selection of horses for hippotherapy.

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- na konia, miejsce prowadzenia terapii, wpływają na częstotliwość tętna koni pracujących w hipoterapii. Masaż wpłynął odmiennie na każdego z badanych koni. U jednego z nich nie stwierdzono rozluźniającego wpływu masażu na pracę serca w czasie zajęć hipoterapeutycznych z dziećmi, zaś u drugiego zastosowanie masażu spowodowało znaczący spadek tętna. Wskazuje to, że różne konie mogą zupełnie odmiennie reagować na zabieg masażu i należy się liczyć z tym, że nie w każdym przypadku przyniesie on spodziewany efekt. Także warunki realizowania terapii (sposób asekuracji pacjenta, sposób wsiadania na konia i miejsca prowadzenia terapii) w sposób istotny wpływały na częstotliwość tętna pracujących koni.

**Streszczenie:** Wpływ masażu klasycznego na parametry pracy serca koni pracujących w hipoterapii. *Studium przypadku.* Celem badań była ocena wpływu masażu na częstotliwość pracy serca koni pracujących w hipoterapii. Zakładano, że masaż, mający pozytywny wpływ na stan psychiczny koni, może służyć jako zabieg relaksujący konie w ich trudnej i monotonnej pracy z pacjentami. Określano też jak wybrane czynniki: sposób asekuracji pacjenta, sposób wsiadania

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