Can the aqua massage machine be used as a method of treatment for lower back pain?

Wellness Centre, adidas UK Ltd

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The Effect of Aqua Massage on Lower Back Pain

Introduction

The aqua massage machine is a unique piece of equipment that provides a combination of three therapies; dry hydrotherapy, heat therapy, and massage therapy. There have been many studies carried out and a vast amount of literature produced on the benefits these therapies provide.

The purpose of this study was to determine whether the aqua massage machine could be used as a method of treatment for individuals suffering from lower back pain. Below is a brief summary of each of the therapies.

Massage Therapy

Massage therapy is the scientific manipulation of the soft tissues of the body for the purpose of mobilising those tissues. Massage therapy affects the circulation of blood and the flow of blood and lymph, reduces muscular tension, effects the nervous system through stimulation or sedation, and enhance tissue healing. Massage is proven to have many benefits such as, relieving muscle spasms, improving flexibility and range of motion, increasing the ease and efficiency of movement and improving posture through changing tension patterns that affect posture (Gale Encyclopedia of Alternative Medicine).

A study carried out by Touch Research Institute in Conjunction with the University of Miami School of Medicine and Iris Burman Educating Hands in 2000 found that adults suffering from low back pain found relief from massage therapy. The study "Lower Back Pain is Reduced and Range of Motion Increased After Massage Therapy" discovered that massage therapy effectively reduced pain, positively impacts on the biochemical system and attenuates psychological symptoms associated with lower back pain (International Journal of Neuroscience, 2001).

Heat Therapy

The aqua massage machine is a form of superficial heat treatment (heat applied to the outside of the body). A low level of therapeutic heat directly applied to an area of pain is proven to relax tight sore muscles and increases blood flow to the muscle (PR Newswire 2000). Heat treatment also increases the extensibility of soft tissues, removes toxins from cells, enhances blood flow, increase function of the tissue cells, to encourage muscle relaxation and helps to relieve pain. (Gale Encyclopedia of Medicine, 1999).

Hydro Therapy

Hydrotherapy is 'the use of water (hot, cold, steam or ice) to relieve discomfort and promote physical well being' (Gale Encyclopedia of Alternative Medicine, 2001). Hydrotherapy has been shown to have many benefits such as soothing sore or inflamed muscles and joints and rehabilitating injured limbs. When water is applied to the body it works reflexively which means that when water is applied to one part of the body other areas are also stimulated by an arterial (blood vessel) reflex or spinal cord reflex (Healthcommunities.com, 2002).

Methodology

Participants

The lower back pain study was carried out at the adidas Wellness Centre. Twenty adidas employees who were suffering with varying degrees of lower back pain volunteered to take part in the trial. Prior to participating all volunteers completed a medical questionnaire to ensure there were no contra - indications preventing them using the aqua massage machine. The volunteers were also asked to sign a consent form to say that they were participating in the trial voluntarily.

Measurements

Both at the beginning of the trial and following the four week trial period, all volunteers were asked to complete a Roland- Morris Disability Questionnaire (Spine volume 25, number 24, 2000) used to assess physical disability due to lower back pain. Volunteers were also asked to perform a sit and reach test used to measure lower back flexibility. A manikin model was used to identify the exact location of the volunteer's back pain (American College of Rheumatology).

Aqua massage

For the purpose of the study a set program was designed focusing in on the area of the back the individual identified on the manikin. Varying water pressures and pulsation speeds were used. The sessions lasted 10 minutes. The programme was as follows:

Table 1: Aqua Massage Programme

Minutes	Programme	Pressure
10:00	Chill out	6 (males) 5 (females)
9.00	Pre-Activity	6 (males) 5 (females)
8.00	Pre-activity: Hold for 10 second intervals along back	6 (males) 5 (females)
7.00	Post Workout	6 (males) 5 (females)
5.00	Fat Buster	5 (males) 4 (females)
3.00	Body Basher	5 (males) 4 (females)
1.00	Pre activity	5 (males) 4 (females)

Protocol

The volunteers were asked to attend an initial meeting where they were randomly allocated into two groups. Ten volunteers formed the treatment group who attended 3 sessions of aqua massage each week for a period of four weeks.

The programme described above was used on each individual in the treatment group. The jets were allowed to travel the length of the body once and then on their return the back was isolated. The machine was programmed so the area identified on the manikin was the only part of the body on which the jets were working.

The ten volunteers forming the control group received no form of treatment during the four-week trial period.

Results

Table 2: Flexibility Measurements

Subject	Group	Flexibility Measure 1	Flexibility Measure 2
a	control	29	26
b	control	30	29
c	control	45	46
d	control	25	29
e	control	31	38
f	control	32	33
g	control	30	23
h	control	22	31

l	**control**	**42**	**44**
j	control	32	-
k	**treatment**	**29**	**32**
l	**treatment**	**24**	**28**
m	treatment	11	10
n	treatment	33	31
o	**treatment**	**38**	**40**
p	**treatment**	**43**	**51**
q	**treatment**	**43**	**47**
r	**treatment**	**20**	**27**
s	**treatment**	**38**	**41**
t	**treatment**	**33**	**41**

Improvement in second flexibility score

Measurements on flexibility and questionnaire data were recorded at the beginning and end of the 4-week trial period. One of the control group did not attend for test 2 and so they were omitted completely from the data set. Consequently results were analysed on 19 subjects (10 treatment and 9 control).

Flexibility Scores

Flexibility was measured using a simple sit and reach test (see figure 1).

Figure 1. Fitech Sit and Reach Test

Table 4: The mean (and standard deviation) flexibility scores at tests1 and 2 for each group is recorded in the following table:

Treatment or Control	Flexibility Measure 1	Flexibility Measure 2
Control	Mean = 31.78 n = 9 stdev=7.4	Mean = 33.22 n=9 stdev=7.9
Treatment	Mean = 31.20 n=10 stdev=10.4	Mean = 34.80 n=10 stdev=11.8

This table shows that at test 1 there were no significant differences in the flexibility score when the 2 groups were compared at the beginning of the study (31.78 compared with 31.20). The flexibility scores for the treatment group were a little more varied (as measured by the standard deviation). By test 2 the treatment group had become more flexible compared with the control group, although it is true to say that both groups had increased their flexibility scores. The mean results can be shown more clearly in figure 2, which shows a significant improvement in the treatment group.

Figure 2: Mean Flexibility Scores

When looking at the control group alone we note that the mean increase in flexibility score is 1.44, but this increase is not statistically significant (using a match paired t-test). Furthermore 6 out of the 9 control subjects increased their flexibility score, whereas 3 had reduced scores. This does not suggest an overall significant improvement.

The average increase in flexibility score for the treatment group is 3.60. This increase is statistically significant at the SP<0.01 (i.e. 1%) level of significance (match-paired t-test), showing that the treatment group had achieved a statistically significant improvement. Also 8 out of the 10 treatment subjects improved their flexibility scores, whilst only 2 had reduced scores. Using a Wilcoxon test (non-parametric test equivalent to the T –test to compare two paired groups) this is again significant (SP=0.014).

Table 3: Roland Morris Disability Index Results

Subject	Group	Roland Morris Questionnaire 1	Roland Morris Questionnaire 2
a	control	4	3
b	control	2	2
c	control	2	1
d	control	12	10
e	control	5	6
f	control	2	1
g	control	10	12
h	control	4	9
I	control	3	4
j	control	4	-
k	treatment	3	1
l	treatment	14	0
m	treatment	4	1
n	treatment	10	4
o	treatment	4	3
p	treatment	7	3
q	treatment	3	0
r	treatment	2	0
s	treatment	2	1
t	treatment	11	5

Reduction in scores of 2-3 points on the Roland Morris Disability Index

Roland Morris Questionnaire Scores

The Roland Morris Questionnaire Results are summarized in table 5.

Table 5

Treatment or Control	Roland Morris Questionnaire 1	Roland Morris Questionnaire 2
Control	Mean = 4.89 n = 9 stdev=3.7	Mean = 5.33 n=9 stdev=4.1
Treatment	Mean = 6.00 n=10 stdev=4.3	Mean = 1.80 n=10 stdev=1.8

Table 5 shows that the Control group started with slightly lower mean scores at test 1 compared with the Treatment group (4.89 compared with 6.00) but not statistically significant, but whereas the Control group increased their score to 5.33, the Treatment group reduced their scores to 1.80. This can be summarized in figure 3.

Figure 3

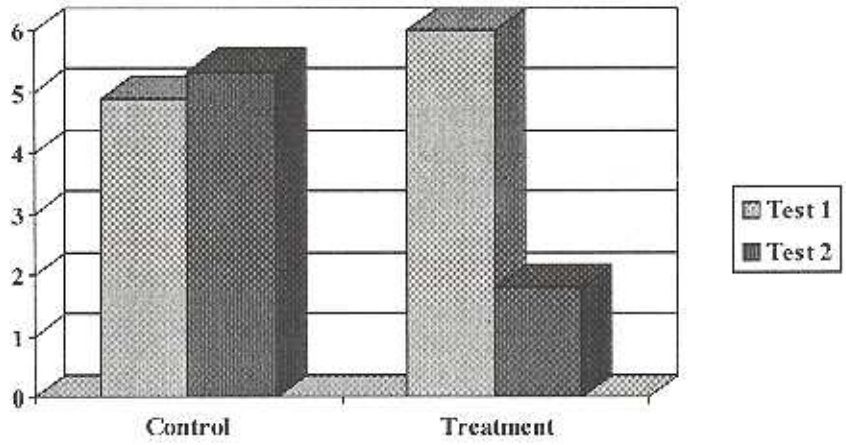

Figure 3 shows the contrast in results from the Questionnaire.

The Control group increased the mean score by 0.44 which was not a statistically significant increase using a match-paired t-test. In addition, out of the 9 control subjects 4 increased their scores, 4 decreased and 1 remained the same. Clearly there is nothing significantly different about the Control group scores when comparing the two test results.

The Treatment group decreased the Roland Morris Questionnaire score from 6.00 to 1.80 a reduction of 4.20. This reduction is statistically significant (SP=0.008) at the 1% level of significance, showing that the treatment has had a significant effect on the score. Furthermore, it is seen that all 10 treatment subjects reduced their scores, emphasizing the effect of the treatment (the Wilcoxon test would yield a statistically significant difference between test 1 and test 2 for the treatment group). It is suggested that a reduction of about 3 in the Roland Morris Questionnaire data indicates a real and noticeable improvement in disability. The fact that the average reduction achieved for the treatment group is 4.20 indicates this improvement is real and reflects a decrease in functional improvement with regards to the lower back.

Conclusion

The experiment shows clearly that for the Control group there are no apparent changes in performance between tests 1 and 2, whereas the Treatment group have significantly increased flexibility scores and significantly reduced Roland Morris Questionnaire scores.

There have been vast amounts of literature proving that independently massage therapy; heat therapy and hydrotherapy can have an effect on range of motion and reducing pain. This trial clearly shows that the combination of the three therapies as provided by the aqua massage machine is having a positive effect by improving flexibility and a noticeable positive effect on reducing disability levels in individuals suffering from lower back pain.