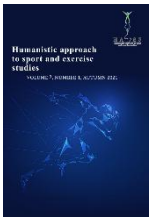
Volume 2 Number 2 Spring 2022 (248-258)

Contents lists available at HASES

Journal of Humanistic approach to sport and exercise studies (HASES)



Original Article

Effect of Massage on Fatigue and Mood in Female Rowers

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Citation: Aeini, M. (2022). Effect of Massage on Fatigue and Mood in Female Rowers. *Humanistic approach to sport and exercise studies (HASES)*, 2(2), 248-258.

Received: 06 January 2022
Accepted: 03 June 2022
Published: 19 June 2022

Publisher's Note: HASES stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Abstract: The present research aims to investigate the effect of massage on fatigue and mood in female rowers. Pre-test and post-test of quasi-experimental design with a control group were used for the experiment. Participants in the study were 30 female rowers from Tehran province who participated voluntarily. The volunteer sample was randomly assigned into two experimental and control groups (15 people in each group). A pre-test was carried out for both groups. The subjects in the experimental group then participated in 12 massage sessions under the supervision of a massage expert. Meanwhile, both groups also continued their regular rowing exercises. At the end of the intervention, a post-test was carried out for both groups. Rating of perceived exertion and fatigue scale (Borg, 1982), mood questionnaire (Vaez Mousavi, 2007), and a researcher-made questionnaire was used to measure variables. Statistical analysis of variance with repeated measurements was used to test the hypotheses. The results suggested that the massage group significantly reduced perceived intensity and fatigue compared to the control group ($P < 0.05$). Also, anger ($P=0.002$), confusion ($P=0.02$), depression ($P=0.028$), mood fatigue ($P=0.015$), and stress ($P=0.039$) significantly decreased in the massage group compared to the control group. Force increased significantly in the massage group compared to the control group ($P=0.008$). In general, the results showed that 12 massage sessions could be used to decrease fatigue and improve mood in female rowers.

Keywords: Massage; Mood; Fatigue; Rowing; Depression.

[DOI: 10.52547/hases.2.2.7]

1. Introduction

A championship is a social phenomenon to discover the maximum human capabilities by participating in specific competition activities (Matveev, 2002). Undoubtedly, athletes need to use all their potential to achieve their desired results and endure a lot of physical and psychological pressure. In most sports, the volume and intensity of pressure on athletes are such that it causes musculoskeletal injuries, depletion of energy, accumulation of waste as well as dysfunction of the immune system. In such circumstances, various recovery methods are used to restore the body's energy reserves, decrease lactate accumulation, and eliminate or decrease the central and peripheral nervous system's fatigue level (Moraska, 2005).

In recent decades, the issue of returning to the original state after performing sports activities has attracted the attention of many researchers. It is a common belief that external interventions with various recovery tools lead to better restoration of the athlete's body's functional reserves and better results (Alexander et al., 2007). Hence, measures related to returning to the original state are as necessary as a physical activity because insufficient restoration of the body's functional capacities amid training activities or competitions decreases the athlete's working capacity. In other words, the organism's adaptation to the conditions of training or competition will increase by rationally scheduling the recovery program and physical activity. In this regard, massage has long been used as a complementary method to treat, improve performance, and prevent injuries (Goodwin, 2002).

A massage is a systematic mechanical manipulation of the body's soft tissues by the hands, performed for therapeutic purposes to increase health and comfort. Due to its unique applications, this intervention is a method that is used today in many fields, such as therapy, and rehabilitation. (Shojaoddin et al., 2009). Many coaches, athletes, and sports therapists believe, based on their observations and experiences, that massage has many benefits for the body, including increased blood flow, decreased muscle tension, and decreased levels of nervous irritability and anxiety. According to them, massage improves athletic performance and prevents injuries. However, the scientific evidence for the effects of massage before training on performance and injury prevention is minimal (Pinar et al., 2012; Weerapong et al., 2005).

Nowadays, although massages amid competition are widely used, assuming that they can accelerate the process of returning to the original state and improving the athlete's level of readiness in competitions, very little research has investigated this claim on rowers. Massage may also affect athletes' moods. Because of the sedative responses that result from massage, several mechanisms have been proposed that are used as a complementary therapy to increase serotonin and dopamine and decrease cortisol to treat patients with depression (Field et al., 2012). Massage increases arterial, venous, and local blood flow and volume stroke, increases serotonin and dopamine, decreases cortisol and inhibits the pain mechanism, improves lymph drainage, and eliminates insomnia. In addition, massage stimulates the sympathetic tone of the central nervous system and reduces heart rate and respiration, and as a result, causes a feeling of relaxation (Vafamand et al., 2013).

Furthermore, massage has beneficial and positive effects in treating anxiety (Fellowes et al., 2004). For example, in a study conducted by Jiro Imanishi et al. in Japan, the anxiolytic effect of aromatherapy massage (massage with special oils) for four weeks (2 sessions per week, 30 minutes per session) for breast cancer patients and observed a decrease in anxiety in the patients (Jiro et al., 2009). Furthermore, another research by Hernandez Reif et al. (2004) was conducted that investigated massage of patients with Swedish massage for 11 weeks in two stages of 5 weeks and six weeks (2 sessions per week, 30 minutes per session) in the neck, chest, back, upper and lower limbs. The results of this study showed a decrease in the levels of stress hormones such as cortisol, epinephrine, and norepinephrine, as well as a decrease in anxiety.

Various studies have been conducted on the physiological and psychological effects of massage on athletes, but the results are not all consistent. However, as mentioned, less research has been carried out on rowers. One of the studies has investigated the effect of massage on athletes' physiological and psychological characteristics. Hemmings et al. (2000) concluded that the psychological effect of massage is more pronounced than its physiological and functional effects by comparing the effects of restoration with and without massage on the physiological, psychological, and functional indicators of amateur boxers in serial activities. In another study, Pilevarzadeh et al. (2002) investigated the effect of massage on reducing pain and anxiety during work. The results showed that in each group, there was progressively increased work-

[DOI: 10.52547/hases.2.2.7]

related pain, but in the massage group, the amount of pain was less than in the control group, and the level of anxiety at the end of the test was significantly reduced in the massage group. The study by Motevasselian et al. (2003) entitled "the effect of massage on the pain and anxiety of burn patients before dressing showed that massage reduces pain and anxiety after dressing. Susanne et al. (2010) conducted a study entitled "the effect of massage therapy on pain, anxiety, and tension in cardiac surgical patients. According to the results, they suggested that massage be performed as an important part of managing the recovery period after surgery for people with cardiac disease. Mancinelli et al. (2006) conducted a study entitled "the effects of massage on delayed onset muscle soreness (DOMS) and physical performance in female collegiate athletes." The results of this study supported the reduction of DOMS and the improvement of vertical jump in female collegiate athletes through massage.

However, since no research has been carried out to investigate the effect of massage on the fatigue and mood of female rowers or it is beyond the reach of the researcher, in this study, we seek to answer the question of whether massage affects the fatigue and mood of female rowers.

2. Methods

The present research is applied and quasi-experimental. This research is a quasi-experimental study with a pretest and post-test design and a control group. The population of the present research includes female rowers in Tehran in the spring of 2018. The research sample is 30 female rowers in Tehran province who participated in this study voluntarily. Then, they were randomly assigned to experimental and control groups (15 people in each group). There was no significant difference between the experimental and control groups regarding age, height, weight, and BMI. First, in one session, the whole research process, its objectives, and possible consequences were explained to the subjects, and their demographic information was obtained from them along with voluntary written consent. They also attended an introductory session on performing the interventions a week before the study. On the day of the pretest, the fatigue and mood of both groups were assessed through a questionnaire. Then, the experimental group participated in 12 massage sessions under the supervision of a massage therapist. However, the control group did not receive this intervention. Finally, both groups continued their regular rowing exercises.

Precise control of nutrition was impossible, and subjects in both groups were asked to continue their regular diet. At the end of the intervention period (12 massage sessions for the experimental group), both groups attended the post-test session, and again the fatigue and mood of both groups were assessed. In order to compare and investigate the changes of variables in the two research groups and in two measurement times (pretest and post-test), the statistical test of analysis of variance between-within subjects with repeated measurements in a 2×2 design (two groups and two times) was used. However, before performing the analysis of the variance test, a comparison was made between the pretests of the two groups using an independent t-test. This was carried out to decide whether an analysis of covariance is more appropriate than analysis of variance. The significance level was considered to be $P \leq 0.05$. All statistical calculations were performed using SPSS software version 19.

2-1. Measurement tools

2-1-1. Fatigue scale

In the present research, the perceived intensity of the exercise was first measured by Borg's (1982) rating of perceived exertion (RPE), and fatigue was assessed using the scale developed based on this scale. Rating of perceived exertion (RPE), a 15-point class scale for perceived exertion rating, is used as a guide to exercise intensity. In this method, people express their perception of the difficulty of what they are doing. RPE grades determine when a person will reach their maximum tolerance. It has been found that this is the most appropriate method for selecting the appropriate intensity of exercise and can be used to complete heart rate estimates. Studies have shown that the RPE is highly correlated with the amount of blood lactic acid and muscle lactic acid, both of which are biochemical signs of cardiorespiratory and muscular fatigue (Borg, 1982). Borg also found the validation of this scale appropriate (r=0.92). The fatigue scale was designed according to the same scale.

2-1-2. Mood questionnaire

Brums' (2007) mood questionnaire was used to measure mood swings. This questionnaire has six subscales: anger, confusion, depression, mood fatigue, stress, and vitality. This questionnaire has 24 questions, and each sub-scale has four questions. Each question has five options: never, slightly, moderate, high, and very high, one of which is

[DOI: 10.52547/hases.2.2.7]

marked by the person, and its scores are determined through the Likert scale as never (0), slightly (1), moderate (2), high (3), and very high (4). The scores of each subscale are calculated by summing the scores of each question on that scale (four questions). The range of scores for each subscale is 0-16. In this questionnaire, the lower the score on anger, confusion, depression, fatigue, and stress subscales, the more desirable the person's condition, and in contrast, the higher the vitality score, the better the person's condition.

2-1-3. Massage program

This study used aromatherapy massage with two massage oils, lemon essential oil, and lavender. The total duration of the massage intervention in the experimental group was 12 sessions in two weeks, in other words, six sessions per week, and each session lasted for 30 minutes after specific exercises. The control group performed only their daily exercises and program, including specific exercises, so these exercises were shared between the two groups. The stages of the massage were as follows: questionnaire, interview, therapist preparation, environment, necessary equipment, effleurage, friction, tapotement, and oils. In addition, the masseuse obtained information about the athlete's condition and medical history through a particular form to collect information.

Talking to the athlete: Interviewing and talking to the athlete, like other aspects of measurement, has a dual purpose: one general goal and several partial goals. On the one hand, we need to know the cause of the problems, and on the other hand, we need to pay attention to the symptoms of pain. In some cases, injuries may occur at a particular time and during a particular movement. For example, when rowing, severe pain is felt in the shoulder. Understanding the cause of the problem is very difficult and requires careful investigation and testing. We note that most of the time, the answers to the questions lie in the information obtained during the interview. Therefore, during the massage, the athlete was talked to.

Therapist preparation: Before touching, the therapist would prepare herself. Attention to personal appearance, hygiene, and makeup of the skin and nails and not wearing a watch and ring were considered.

Environment: A warm and well-ventilated environment that was not exposed to rapid air currents was considered.

Equipment included linens, small and large washable blankets with covers, well-sized pillows and their covers, and a massage bed.

The massage techniques were as follows:

Effleurage (stroking): This is one of the leading massage movements performed anywhere on the body. This movement included the beginning and end of the massage and facilitated the workflow from one movement to the next.

Friction (rubbing): Friction movements are usually performed using thumb tips. Performing circular movements of the thumb tips (frictions), we moved the muscles towards the bone, stopped on the desired area, and put a lot of pressure on it.

Pétrissage technique (gripping and squeezing the muscles): involves gripping, squeezing, pressing, rolling, and twisting, and is a powerful movement in which we messaged the muscles profoundly and apply these movements to other parts of the body (except for the face), which is especially useful for fleshy and boneless areas such as the thighs and buttocks.

Tapotement (tapping movements): This technique consists of fast and light tapping movements applied regularly and intermittently by the hands.

Oils: The only correct method of massage is to use oil that prevents scratches on the body. Therefore, this study used lemon and lavender oils for massage.

3. Results

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in perceived intensity of the two groups are reported in Table 1. In addition, the results of independent t-test to compare the difference between the means of the two groups are summarized in Table 2.

Table 1. Results of analysis of mixed variance between-within subjects to compare changes in perceived intensity of subjects in the two groups

Factor	F	P	Effect size
Time	611.59	* 0.001	0.98
group	6.90	* 0.014	0.19
Time×Group	5.47	* 0.005	0.38

* Significant at the level of P≤0.05

[DOI: 10.52547/hases.2.2.7]

Table 2. Results of independent t-test to compare the difference between the means of the two groups for perceived intensity

Comparison of differences	t	P
Comparison of the difference before and after pre-test	3.15	* 0.004
Comparison of the difference before and after post-test	4.09	* 0.01
Comparison of the difference between pre-test and post-test	2.58	* 0.015

* Significant at the level of P≤0.05

As can be seen, perceived intensity decreased significantly in the massage group compared to the control group (P <0.05).

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in fatigue of the two groups are reported in Table 3. In addition, the results of independent t-test to compare the difference between the means of the two groups are summarized in Table 4.

Table 3. Results of analysis of mixed variance between-within subjects to compare changes in fatigue of subjects in the two groups

Factor	F	P	Effect size
Time	201.02	* 0.001	0.95
group	4.50	* 0.043	0.13
Time×Group	8.43	* 0.001	0.49

* Significant at the level of P≤0.05

Table 4. Results of independent t-test to compare the difference between the means of the two groups for fatigue

Comparison of differences	t	P
Comparison of the difference before and after pre-test	2.52	*0.017
Comparison of the difference before and after post-test	3.66	* 0.001
Comparison of the difference between pre-test and post-test	2.13	* 0.041

* Significant at the level of P≤0.05

As can be seen, fatigue decreased significantly in the massage group compared to the control group (P <0.05).

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in anger of the two groups are reported in Table 5.

Table 5. Results of analysis of mixed variance between-within subjects to compare changes in anger of subjects in the two groups

Factor	F	P	Effect size
Time	6.65	* 0.015	0.19
group	10.04	* 0.004	0.26
Time×Group	12.37	* 0.002	0.30

* Significant at the level of P≤0.05

As can be seen, anger decreased significantly in the massage group compared to the control group (P =0.002).

The results of analysis of mixed variance between-within subjects by repeated measurements to

[DOI: 10.52547/hases.2.2.7]

compare changes in confusion of the two groups are reported in Table 6.

Table 6. Results of analysis of mixed variance between-within subjects with repeated measurements to compare changes in confusion of subjects in the two groups

Factor	F	P	Effect size
Time	1.77	0.19	0.06
group	0.47	0.49	0.01
Time×Group	6.13	* 0.02	0.18

* Significant at the level of P≤0.05

As can be seen, confusion decreased significantly in the massage group compared to the control group (P =0.002).

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in depression of the two groups are reported in Table 7.

Table 7. Results of analysis of mixed variance between-within subjects to compare changes in depression of subjects in the two groups

Factor	F	P	Effect size
Time	1.92	0.17	0.06
group	0.27	0.60	0.01
Time×Group	5.34	* 0.028	0.16

* Significant at the level of P≤0.0

As can be seen, depression decreased significantly in the massage group compared to the control group (P =0.0028).

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in mood fatigue of the two groups are reported in Table 8.

Table 8. Results of analysis of mixed variance between-within subjects to compare changes in mood fatigue of subjects in the two groups

Factor	F	P	Effect size
Time	0.38	0.54	0.013
group	0.002	0.96	0.001
Time×Group	6.69	* 0.015	0.19

* Significant at the level of P≤0.05

As can be seen, mood fatigue decreased significantly in the massage group compared to the control group (P =0.015).

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in stress of the two groups are reported in Table 9.

Table 9. Results of analysis of mixed variance between-within subjects to compare changes in stress of subjects in the two groups

Factor	F	P	Effect size
Time	1.35	0.25	0.04
group	1.01	0.32	0.03
Time×Group	4.67	0.039	0.14

* Significant at the level of P≤0.05

[DOI: 10.52547/hases.2.2.7]

As can be seen, stress decreased significantly in the massage group compared to the control group (P =0.039).

The results of analysis of mixed variance between-within subjects by repeated measurements to compare changes in force of the two groups are reported in Table 10.

Table 10. Results of analysis of mixed variance between-within subjects to compare changes in force of subjects in the two groups

Factor	F	P	Effect size
Time	0.61	* 0.44	0.02
group	0.33	0.56	0.01
Time×Group	8.26	* 0.008	0.22

* Significant at the level of P≤0.05

As can be seen, force decreased significantly in the massage group compared to the control group (P =0.008)

4. Discussion

According to the present research findings, a short period of massage led to a significant decrease in fatigue and a significant improvement in the mood of female rowers. In this research, the effect of massage on fatigue and mood of rowers is investigated for the first time, and previous studies have been conducted more on other athletes. Moreover, studies that have studied the effect of massage on athletes have usually considered other physiological variables such as heart rate and physical and bioenergetic functions, and those that have investigated the effect of massage on fatigue and moods have usually studied non-athletes and most patients. Therefore, caution should be exercised in interpreting the present findings, as the results of this study cannot simply be compared with other studies. In any case, the findings of this study are somehow and to some extent consistent with the findings of Karen et al. (2009) and Furlan et al. (2009) abroad and with the findings of Abbasi et al. (2011), Yaghoubi et al. (2009) and Jozi (2009) in the country. The results of Bahraini et al. (2011), to compare the effect of effleurage massage with aromatic and non-aromatic oils on the severity of fatigue in women with multiple sclerosis, also showed that massage reduces the severity of fatigue in this group of patients. The results of the study by Lee et al. (2005) to investigate the effect of foot reflexology massage on the severity of fatigue and insomnia in patients with coal workers' pneumoconiosis also showed that foot reflexology massage could be an effective nursing intervention in reducing insomnia and fatigue of this group of patients. The study by Ko et al. (2007) to investigate the effect of self-foot reflexology on the severity of fatigue and sleep in nurses showed that self-foot reflexology massage also reduces the severity of pain and insomnia in this group. Rodenburg et al. (1994), Smith et al. (1994), and Tiidus et al. (1995) showed that massage partially reduces the symptoms of the delayed onset muscle soreness syndrome. Karagozoglu et al. (2013), who conducted a study investigating the effect of back massage on chemotherapy-related fatigue, showed that massage during chemotherapy for 60 to 70 minutes alternately affected subjects' fatigue and decreased it. They write that massage is an effective and complementary method along with other standard treatments as a non-drug and low-complication treatment is effective in significantly reducing and relieving fatigue. Atashi et al. (2014) conducted a study entitled "investigating the effect of superficial stroke back massage on fatigue in patients with MS," in which 64 men and women with an age range of 20-45 years admitted to the Qazvin MS Association participated in it and divided into intervention and control groups and the intervention group received massage for 10 minutes during seven sessions. The results showed that superficial stroke back massage could be effective as a method to relieve fatigue in these patients.

Furthermore, the study by Hassankhani et al. (2013) to investigate the effect of superficial stroke back massage on dialysis patients showed that performing the superficial back stroke massage for 10 minutes (three days a week for four weeks) during dialysis can relieve fatigue caused by dialysis. Bagheri Nesami et al. (2012) found a significant difference in fatigue between the control group and the group under foot reflexology massage after intervention in the studied patients. A study in 2010 found that massage and relaxation each alone reduced perceived fatigue, but there was a difference between the effect of massage and relaxation on improving fatigue. Massage could improve muscular function after fatigue, while relaxation did not have such an effect,

[DOI: 10.52547/hases.2.2.7]

and massage was a more compelling factor in improving fatigue than relaxation (Ghasemi et al., 2010).

One may conclude that massage can most likely increase relaxation and reduce pain by increasing the secretion of endorphins. The mechanical pressures of massage stimulate the parasympathetic nerve and thus reduce heart rate, lower blood pressure; increase sedative hormones such as endorphins and serotonin, and gain more relaxation and concentration after a massage can be one the important reasons for reducing the intensity of pain and fatigue (Crosman et al., 1984; Fraser & Kerr, 2009; Moeini et al., 2001). Massage also increases blood flow and oxygen supply by affecting the musculoskeletal system. Increased blood flow to the massaged area improves nutrition and increases the excretion of waste products, including lactic acid, which leads to energy release and fatigue relief (Soltanzadeh et al., 2002).

Massage may also stimulate the release of endorphins and enkephalin, natural pain relievers and mood enhancers (McCabe, 1996). Some body parts, including the fingers and toes, are sensitive to touch and pressure. The message then travels back through the ganglia, nerve cord, and motor neurons to the muscle groups, and massage accordingly affects the body and muscles, causing them to relax and become comfortable (O'Rourke et al., 2002). Therefore, it can be said that massage affects the fatigue of muscles. On the other hand, this technique can indirectly improve depression by reducing pain, creating relaxation, and improving sleep (McCabe, 1996). Serotonin and dopamine are two neurotransmitters of biogenic amines that are most involved in the pathophysiology of mood disorders. The levels of these neurotransmitters appear to decrease in mood disorders such as depression. In addition, in the case of cortisol, levels appear to increase the level of this neurotransmitter (Sturgeon et al., 2009). Therefore, massage can reduce the release of stress hormones (cortisol) in the body and boost the transfer of serotonin and dopamine hormones, which are needed to calm the nerves (Hernandez et al., 2004). Since the findings of the present study were consistent with the findings of many other researchers (Vafamand et al., 2013; Field et al., 2012; Roozbayani, 2010; Field et al., 2005; Yi-Ching & Tsay, 2004; Susie et al., 2007; Hernandez et al., 2004), it seems that it can be concluded that massage therapy plays a vital role in improving mood. The sound effect of massage on improving mood is probably nervous irritability, increased parasympathetic activity, and decreased cortisol levels. On the other hand, massage increases dopamine and serotonin levels, making the person feel relaxed, and their mood improves (Ghasemi et al., 2012).

5- Conclusion

Finally, it is recommended that female rowing coaches use effleurage massage with exercises to decrease fatigue and improve athletes' moods. Given that intensive training can increase athletes' pain and fatigue and lead to a decrease in their athletic performance, and also sports camps and intensive training due to increased fatigue and being away from the family can decrease the mood and mental state of athletes, massage therapy can be helpful in this regard. It can be used as a complementary intervention to prepare female rowers.

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[DOI: 10.52547/hases.2.2.7]

دوره ۲ - شماره ۲ - بهار ۱۴۰۱ (۲۵۸-۲۴۸)

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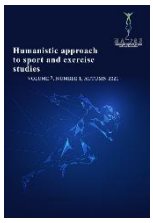

اثر ماساژ برخستگی و حالات خلقی بانوان قایقران

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ارجاع: آیینی، م. (۱۴۰۱). اثر ماساژ برخستگی و حالات خلقی بانوان قایقران. *فصلنامه رویکرد انسانی در مطالعات ورزشی*. ۲(۲): ۲۵۸-۲۴۸.

دریافت: ۱۶ دی ۱۴۰۰

پذیرش: ۱۳ خرداد ۱۴۰۱

انتشار: ۲۹ خرداد ۱۴۰۱

چکیده: هدف از پژوهش حاضر، بررسی تاثیر ماساژبر خستگی وحالات خلقی بانوان قایقران بود. از طرح شبه آزمایشی پیش آزمون-پس آزمون با گروه گواه برای آزمایش استفاده گردید. شرکت کنندگان در پژوهش ۳۰ نفر از بانوان قایقران استان تهران بودند که بصورت داوطلبانه مشارکت کردند. نمونه داوطلب به طور تصادفی به دو گروه آزمایش وگواه (هر گروه ۱۵ نفر) واگذار شدند. برای هر دو گروه پیش آزمون صورت گرفت. سپس آزمودنی های گروه آزمایش در ۱۲جلسه ماساژ زیر نظر متخصص ماساژ شرکت کردند. ضمنا هر دو گروه به تمرینات عادی قایقرانی خود نیز ادامه می‌دادند. بعد از پایان مداخله، برای هر دو گروه پس آزمون انجام شد. از مقیاس فشار و سختی ادراک شده و مقیاس خستگی، پرسشنامه حالات خلقی و پرسشنامه محقق ساخته برای سنجش متغیرها استفاده شد. از آزمون آماری تحلیل واریانس با اندازه گیری مکرر برای آزمون فرضیه‌ها بهره گرفته شد. نتایج نشان داد که شدت درک شده وخستگی در گروه ماساژ در مقایسه با گروه کنترل به طور معنادار کاهش یافته است (P<۰/۰۵). همچنین، خشم (P=۰/۰۰۲)، گیجی (P=۰/۰۲)، افسردگی (P=۰/۰۲۸)، خستگی خلقی (P=۰/۰۱۵)، و تنش (P=۰/۰۳۹)، در گروه ماساژ در مقایسه با گروه کنترل به طور معنادار کاهش یافتند. نیرو در گروه ماساژ در مقایسه با گروه کنترل به طور معنادار افزایش یافت (P=۰/۰۰۸). نتایج در مجموع حاکی از آن بود که ۱۲جلسه ماساژمی تواند برای کاهش خستگی و بهبود حالات خلقی بانوان قایقران مورد استفاده قرار گیرد.

واژه‌های کلیدی: ماساژ؛ حالات خلقی؛ خستگی؛ قایقرانی؛ افسردگی؛

[DOI: 10.52547/hases.2.2.7]