Original Article

Effectiveness of Dry Cupping Therapy on Fatigue and Quality of Life of Women with Multiple Sclerosis: Randomized Clinical Trial

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Abstract

Background: Fatigue is one of the most common symptoms in patients with Multiple Sclerosis (MS). It can cause severe psychological problems and reduce their Quality of Life (QOL). Cupping therapy is known as a method of alternative medicine that can be used to treat or reduce patient symptoms. Thus, this study was conducted to determine the effect of dry cupping therapy on the fatigue and QOL of women with MS. **Materials and Methods:** This randomized clinical trial was conducted on 60 patients (30 patients in each group) with MS referred to the Medical Center of Special Diseases in southeast Iran. Patients in the intervention group received eight sessions of dry cupping therapy twice a week over 4 weeks, while the control group received routine fatigue reduction methods. Data were collected before and after the intervention by using the demographic information questionnaire, the Fatigue Severity Scale, and the Multiple Sclerosis Quality of Life questionnaire. Data were analyzed using SPSS 18. The significance level was 0.05. **Results:** Thirty patients entered the study; none of them were excluded from the study, and 30 patients were finally analyzed. Before the intervention, there was no statistically significant difference between the two groups in terms of fatigue (intervention group: 47.67) 7.83); control group: 47.63) 8.76)) and QOL (intervention group: 48.85) 9.55); control group: 49.64) 9.90) (t = 0.018, p = 0.98 and t = 0.31, p = 0.75, respectively)). After performing cupping therapy in the intervention group, a significant decrease and increase were observed in the mean (SD) score of fatigue (intervention group: 34.48) 6.16); control group: 46.85 (8.95)) and QOL (intervention group: 60.14) 7.46); control group: 51.96) 9.45)), respectively ($p < 0.001$). **Conclusions:** The findings showed that cupping therapy significantly reduced the patients' fatigue and increased their QOL. This method is recommended for reducing fatigue and improving QOL in patients with MS.

Keywords: *Cupping therapy, fatigue, multiple sclerosis, quality of life*

Introduction

Multiple Sclerosis (MS) is the most common debilitating disease in young people[1] and the third leading cause of neurological disability.[2] The Multiple Sclerosis Association of America (MSAA) estimates that approximately 2.5 million people worldwide are affected by this disease, and 200 cases are added to this figure each week.[3,4] In recent decades, statistics have shown a growing trend of MS in the world, especially in Iran.[5] In Iran, according to the latest statistics, the number of MS patients is about 40,000.[6] The prevalence of MS in Kerman province, located in southeast Iran, is between 31.5 and 50.5 per 100,000 people.[7] MS threatens the patient's independence and ability to participate effectively in family and community affairs. It also affects all aspects of a patient's daily life, such as Quality of Life (QOL),[1] and creates a sense of inadequacy in the patient.[8]

QOL encompasses various aspects of one's life, including physical, mental, and spiritual aspects that play important roles in health. According to studies, the QOL of patients with MS is lower than average.[9] A fatigue level of 83% is the most common symptom in MS and has the most significant impact on the QOL of MS patients.[10] Fatigue is present in 67%–95% of patients with MS, from whom 50%–60% consider it as the worst and 15%–40% as the most debilitating symptom of MS.[11] The MSAA defines fatigue as mental and emotional exhaustion caused by a lack of physical and mental energy to perform and complete routines and favorite activities.[12] Patients with MS describe disease-related

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fatigue as progressive exhaustion during the day or as an abnormal and persistent sense of exhaustion.[8]

Although therapies may prevent or slow down the progression of MS, they cannot eliminate many of its symptoms, such as fatigue, which makes it harder for patients to move around and perform their daily chores.[13] MS medications also cause fatigue; thus, the researchers have focused on non-pharmacological methods, as many patients also favor them.[10]

Cupping therapy is one of the ancient therapeutic methods used in traditional medicine in different countries such as India, China, Greece, and Iran. Cupping has a long history in Iran and was used before Islam. After Islam, according to Islamic teachings, cupping has been considered and is one of the most widely used methods in the prevention and treatment of diseases in Persian medicine. It is a well-known traditional medicine among Muslim cultures. In this method, a cup applies a localized negative pressure on the patient's skin. There are many types of cupping therapy; however, dry and wet cupping are the two main types. Dry cupping (*Badkesh*) pulls the skin into the cup without scarifications, while in wet cupping (*Hejamat*), the skin is lacerated so that blood is drawn into the cup. Depending on the type of devices that cause negative pressure, dry cupping therapy is divided into two types: warm dry cupping and cold dry cupping. In cold dry cupping, suction pumps are used, and in warm dry cupping, the flame is used to warm up the cups.[14,15]

Although some studies have generally used complementary medicine, including herbal medicine, cupping therapy, relaxation therapies, acupuncture, and leech therapy in patients with MS,[16-19] no study has specifically examined the effect of cupping therapy as one of the methods of traditional medicine on the fatigue and QOL of patients with MS. Sohn *et al*.[20] examined the effect of cupping therapy on shoulder pain and fatigue in 27 nurses, and concluded that cupping can be an effective nursing intervention to relieve nurses' shoulder pain and fatigue. Mohammadi *et al*.[21] stated that nurses have an ideal, unique, and strategic position in using complementary and alternative medicine. Nursing is one of the first professions that facilitated the use of complementary and alternative medicine because nurses look at the client holistically, and this medicine corresponds to this philosophy. Complementary and alternative medicine is also used as an intervention for many nursing diagnoses;[22] thus, some nursing associations have supported incorporating this method into conventional healthcare and described its use as part of the nurses' job description.[21]

Nurses have a unique opportunity to provide services that facilitate wholeness. They need to understand all aspects of CAM, including costs, patient knowledge, and drug interactions, to promote holistic strategies for patients seeking to achieve a higher QOL.[23]

Considering the characteristics of MS, such as fatigue and its effect on patient's QOL, as well as the importance of complementary and alternative medicine along with modern medicine and also taking into account the limited studies conducted in this field, despite some mild and rare side effects such as itching, irritation and pain in the inflated area, headache, confusion and sleepiness, in a short period after the inflation, the present study was conducted to determine the effect of dry cupping therapy on the fatigue and QOL of women with MS. As patients with MS are the most vulnerable to extreme heat, dry cupping therapy was selected. Due to easier access to women, the statistical population was selected from them. Thus, this study was conducted to determine the effect of dry cupping therapy on the fatigue and QOL of women with MS.

Materials and Methods

This is a single-blind, randomized clinical trial (IRCT20151107024919N8) study. This study was conducted from July 28, 2019 until September 5, 2019. The research population in this study included all patients with MS referred to the Medical Center of Special Diseases, Kerman, 2019. According to Sayyah *et al*.[1], and using the sample size formula, the alpha was equal to 0.05, Z_{α} = 1.96, 1- β = 0.80, and Z_{β} = 0.84. In this study, we wanted to determine the difference between the intervention and control group scores by at least 0.97 points; thus, the number of subjects in each group was calculated to be 21. However, considering the 25% sample dropout, the sample size was considered 30 subjects in each group [Figure 1]. Therefore the total number of samples was 60 MS patients referred to the Medical Center of Special Diseases, the largest center in southeast Iran. Inclusion criteria were being between 18 and 60 years old,[24] being familiar with the Persian language,[25] having a diagnosis of MS by a neurologist,[1] obtaining a score of 36 or higher on Fatigue Severity Scale (FSS) at the beginning of the study,[26] not using anticoagulants, not having coagulopathy or psychotic disorders based on self-report,[1] not having chronic or other underlying diseases such as cancer or diabetes that affect fatigue and QOL,[25] not having a history of surgery in the last 6 months, and not having abnormal wounds or redness at the scapula and lumbar regions.[26] Exclusion criteria were experiencing changes in the disease process that led to hospitalization, not following the cupping therapy program for any reason,[25] and recurrence of symptoms during the intervention.[27]

Data collection tools included a demographic and disease information form, the FSS, and the Multiple Sclerosis Quality Of Life Questionnaire (MSQOL-54).[1] The demographic and disease information form had questions about age, sex, marital status, education, employment status, type of disease (including relapsing-remitting MS, primary progressive MS, secondary progressive MS, and progressive-relapsing MS), type of medication, duration of the disease, and number of relapses in the recent

year.[28-30] The Fatigue Severity Scale (FSS) is a self-reported and reliable measure of the fatigue level of MS patients.[31] This scale includes nine questions on a 7-point Likert scale: five measuring the quality of fatigue, three measuring physical and mental fatigue and the effects of fatigue on social status, and one comparing the severity of fatigue and other symptoms in a patient with MS. The score for each question is in a range of 1–7. The total score is obtained by summing up the scores between 9 and 63. A score of 36 or higher indicates fatigue, and a higher score reflects a higher level of fatigue.[25] The validity and reliability of FSS have been checked and confirmed in various studies. Shahvarughi *et al*. (2013), while evaluating the reliability of the Iranian version of this scale among patients with MS, reported its internal consistency by calculating the Cronbach's alpha coefficient of 0.96.[32] MSQOL-54, developed by Wicker in 1995, is a special tool for assessing QOL in patients with MS. The MSQOL-54 includes 54 questions, 18 of which deal with 14 specific areas in patients with MS (physical health, role limitations due to physical problems, role limitations due to emotional problems, pain, emotional well-being, energy, health perceptions, social function, cognitive function, health distress, sexual function, change in health, satisfaction in sexual function, and overall QOL). The other 36 questions are related to the general QOL. The questions are based on a 2–7-option Likert scale. The patient's QOL score is determined by summing up the scores of the two areas, which include physical health and mental health. The scores of all 14 areas, and the two combined areas, are 0–100, with a higher score indicating better QOL.[33] The validity and reliability of this tool have been confirmed in various studies.[34] In Iran, Khodaveisi *et al*. (2014) reported the validity of this questionnaire to be appropriate, with Cronbach's alpha coefficient of 0.99.[35]

After obtaining the ethical code from the Ethics Committee of Kerman University of Medical Sciences, the researcher presented a letter of introduction to the Medical Center of Special Diseases officials, the largest center in the southeast of Iran. The sampling was conducted using a convenience method based on the inclusion criteria. Using a block randomization method with a block size of 4 and also R software, two participants were placed in each of the intervention and control groups within each block, and then, patients were randomly divided into control (30 patients) and intervention (30 patients) groups. The blind statistician generated the random allocation sequence, and the first researcher enrolled and assigned participants to interventions. R is a free software environment for statistical computing and graphics. It is helpful for data cleaning, analysis, and visualization.

Patients completed the FSS and MSQOL-54 questionnaires before and 4 weeks after the intervention. If a questionnaire was incompletely filled, it was deleted. The two groups were homogeneous regarding demographic and disease-related variables at the beginning of the study and at the end of the fourth week. In addition to showing an instructional video on how cupping therapy is performed before the intervention, the researcher explained the possible complications for the intervention group. Patients were reassured that the symptoms of cupping therapy would disappear after 2–3 weeks. Patients in the intervention group received eight sessions of cupping therapy for 4 weeks[36] (two sessions per week). The intervention was performed by a traditional medicine specialist. The patient was in the prone position while the hands were on both sides of the body during the treatment.

First, the patient's scapula to the waist was gently massaged with 4–5 drops of chamomile oil (37 mL, 85 g) for 3–4 minutes.[37] Cold cupping was performed using silicone cups, which can be 6–10 depending on the person's size, on both sides of the spine, around the intervertebral line, from the scapula to the waist area. After placing the cup, a vacuum device pulled the skin (up to 0.5–1 cm).[37] Then, by creating a mechanical suction with a vacuum device made by the center itself, the blood was drawn from the deep parts to the skin until 0.5–1 cm of the tissue entered the glass. As a result, blood was drawn from the deep tissue to the skin's surface. Cups (Shabani manufacture) were removed from the positions before changing the tissue color to purple. In case of complications due to cupping therapy in the intervention group, a complementary medicine specialist visited the patients, and all necessary measures were taken to eliminate the complications. During and up to 2 weeks after the intervention, the researcher was in contact with the patients to answer questions and follow up on possible concerns. In this study, data were analyzed using SPSS software version 18, which used central tendency, dispersion indicators, *t*-tests, Chi-square, and ANCOVA. The significance level of 0.05 was considered for all tests.

Ethical considerations

Participants were told that they could leave the study at any time without any consequences. Written informed consent was obtained from the patients, and they were reassured that their personal information would remain confidential and only be used to achieve research objectives (IR.KMU.RESEARCH.1398.168).

Results

Descriptive results

In this study, the two groups were similar in terms of demographic and disease characteristics [Table 1]. Type of disease, time of onset of disease, recurrence in the past 1 year, and medication were controlled and matched between the two groups. The Chi-square test results showed the two groups were similar in terms of the above characteristics [Table 1]. Among patients in the intervention group, 16.6% complained about hematoma, 10% complained about pruritus, and 0.6% complained about vertigo. To determine the normality of fatigue severity and QOL scores, skewness and kurtosis were calculated, which

Table 1: Demographic and disease characteristics of patients with multiple sclerosis

Variables		Intervention group *n* (%)	Control group *n* (%)	χ^2	*p*
Job status					
	Employed	12 (40)	9 (30)	0.65	0.41
	housewife	18 (60)	21 (70)		
Level of Education					
	Illiterate and elementary	3 (10)	1 (3.3)		
	Diploma and lower	14 (46.70)	21 (70)	3.59	0.16
	Academic	13 (43.3)	8 (26.71)		
Type of disease					
	RRMS*	25 (83.33)	26 (86.70)		
	PPMS**	3 (10)	3 (10)	0.35	0.83
	SPMS***	2 (6.7)	1 (3.33)		
	PRMS****	0 (0)	0 (0)		
Time of onset of the disease (Year)					
	1–5	10 (33.33)	10 (33.33)	0.001	1
	5–10	10 (33.33)	10 (33.33)		
	≥10	10 (33.33)	10 (33.33)		
Recurrence in a recent year					
	0	14 (46.66)	16 (53.33)	0.27	0.87
	1–2	15 (50)	13 (43.33)		
	>2	1 (3.33)	1 (3.33)		
Medication	Interferon beta1	12 (40)	13 (43.33)	0.11	0.99
	Glatiramer acetate	2 (6.66)	2 (6.66)		
	Fingolimod	7 (23.33)	6 (20)		
	Dimethyl Fumarate	8 (26.66)	8 (26.66)		
	Rituximab	1 (3.33)	1 (3.33)		
Monthly income (Million)					
	≤1	12 (40)	10 (33.33)	0.35	0.83
	1–3	15 (50)	16 (53.33)		
	>3	3 (10)	4 (13.33)		
Temperament in terms of cold and warmth	Cold	2 (6.66)	2 (6.66)	0.61	0.996
	mild	23 (76.66)	23 (76.66)		
	Hot	5 (16.66)	5 (16.66)		
Temperament in terms of dryness and wetness	Wet	9 (30)	8 (26.71)	0.19	6.12
	mild	10 (33.33)	11 (36.66)		
	Dry	11 (36.66)	11 (36.66)		

*Relapsing-Remitting MS, **Primary Progressive MS, ***Secondary Progressive MS, ****Progressive Relapsing MS

were between +2 and −2. Therefore, the fatigue severity and QOL scores had a normal distribution.

Fatigue

The mean (SD) score of fatigue of participants was examined before and after the intervention and compared using paired *t*-tests [Table 2]. According to the paired *t*-test results, the mean (SD) score of fatigue of participants was 47.63) 8.76) before and 46.85) 8.95) after the cupping therapy in the control group and did not show a statistically significant difference (t = 0.38, p = 0.70) [Table 3]. In contrast, in the intervention group, the mean score of fatigue severity after the intervention (34.48) 6.16)) decreased by 13.19 compared to before the intervention (47.67) 7.83)) (t = 9.22, $p < 0.001$) [Table 4]. The mean score of fatigue of participants was 47.67) 7.83) in the intervention group and 47.63) 8.76) in the control group before the intervention, which was no statistically significant (t = 0.018, p = 0.98) [Table 2], while the mean (SD) score of fatigue was 46.85) 8.95(in the control group and 34.48) 6.16(in the intervention group, which was statistically significant (F = 26.22, $p < 0.001$) [Table 4].

Quality of life

According to the independent *t*-test result, there was no statistically significant difference in the mean (SD) score of QOL between the intervention (48.85) 9.55)) and control (49.64) 9.90)) groups before the intervention (t = 0.31, p = 0.75) [Table 2]. In addition, according to the paired *t*-test

Table 2: Comparison of fatigue and quality of life in the two groups before and after the intervention

Variables	Group	Before intervention Mean (SD)	After the intervention Mean (SD)	Paired *t*-test	*p*
Fatigue	Control	47.63 (8.76)	46.85 (8.95)	0.38	0.70
	Intervention	47.67 (7.83)	34.48 (6.16)	9.22	<0.001
Quality of life	control	49.64 (9.90)	51.96 (9.45)	1.27	0.21
	Intervention	48.85 (9.55)	60.14 (7.46)	9.54	<0.001

Table 3: Comparison of fatigue and quality of life between two groups before the intervention

Variables	Intervention group Mean (SD)	Cotrol group Mean (SD)	Independent *t*-test	*p*
Fatigue	47.67 (7.83)	47.63 (8.76)	0.018	0.98
Quality of life	48.85 (9.55)	49.64 (9.90)	0.31	0.75

results, the mean (SD) score of QOL before (49.64) 9.92)) and after (51.96) 9.45)) the cupping therapy in patients in the control group did not show a statistically significant difference (t = 1.27, p = 0.21) [Table 3]. In contrast, in the intervention group, the mean (SD) score of QOL after the intervention (60.14 (7.46)) increased by 8.59 compared to before the intervention (48.85) 9.55)), which was statistically significant (t = 9.54, p < 0.001) [Table 4].

In the intervention group after the cupping therapy, the mean score of QOL in the mental dimension was 15.28 higher than that in the control group (p = 0.0001). In contrast, this mean score in the physical dimension did not show a statistically significant difference (p = 0.31). As a result, cupping therapy had a greater effect on the mental health dimension of QOL than the physical health dimension. In the mental dimension of QOL, the mean score of QOL in the intervention group after cupping therapy, in the areas of emotional well-being and role limitation due to emotional problems, was 13.90 and 47.77 higher than in the control group, respectively. No statistically significant changes were observed in the other dimensions of QOL.

Discussion

The present study showed that cupping therapy positively affected the fatigue of women with MS.

In the literature review, there was no study on the effect of cupping therapy on the fatigue of patients with MS. However, among the studies that have used this method to reduce fatigue in different populations, we can refer to Chen *et al*.'s study (2008), which investigated the therapeutic effect of cupping therapy on the posterior points in people with chronic fatigue syndrome.[38] Another study by Chien *et al*. (2018) investigated the effects of cupping therapy on reducing upper limb muscle fatigue in healthy individuals.[39] It should be noted that the results of these studies are consistent with the present study's findings. The MS Association Clinical Guide defines MS fatigue as a lack of physical and mental energy experienced by the individual, which affects the individual's activities.[40]

By stimulating the nerves, cupping therapy can return energy to the person and reduce fatigue. Arslan *et al*.[38] noted that cupping therapy stimulates sympathetovagal imbalance by stimulating the peripheral nervous system. Pooryaghob *et al*.[6] also believe that cupping therapy strengthens blood circulation and increases the excretion of waste products from the body. Therefore, it can improve the patient's functional status and progressive muscle relaxation by improving microcirculation, promoting capillary endothelial cell repair, and accelerating granulation and angiogenesis in internal tissues. It should be noted that in the two aforementioned studies, fatigue syndrome and upper limb muscle fatigue were assessed using different tools. However, cupping therapy resulted in a reduction in fatigue. Therefore, it seems that cupping therapy can reduce fatigue. Fatigue can be divided into two types: central and peripheral, each with its own pathology and treatment. Peripheral fatigue is equivalent to muscle fatigue, which reduces the muscle's capacity to generate energy due to physical exertion and neuromuscular disorders. It also resolves with rest. In central fatigue, which is associated with attention and concentration problems, people express a feeling of constant tiredness that leads to poor performance. Patients with MS experience both types of fatigue.[40] The instrument used in the present study was also able to assess both types of fatigue in patients. To our knowledge, there was no study in the literature to contradict our findings. However, some studies have examined the effectiveness of complementary medicine methods on fatigue in patients with MS.

Rigi *et al*.'s[12] study indicated the effect of foot reflexology massage on reducing fatigue in women with MS. Although reflexology has a similar mechanism to cupping,[41] it causes symptoms such as increased sensitivity or a temporary tingling sensation in the foot during or after the first reflexology session. Other uncommon side effects of reflexology include nausea, excessive sweating, thirst, insatiability, and skin rash.[42] There is also the possibility of temporary pain, discomfort, tissue bruising, swelling, and skin sensitivity.[43] Tajik *et al*.[44] reported acupuncture's positive effect on fatigue in patients with MS. Valiee *et al*.[45] noted that acupuncture is an invasive intervention and also carries the risk of AIDS and hepatitis. Considering that the treatment method's purpose is to reduce the patient's problems with the least side effects, it seems that cupping therapy can be used with fewer side effects than reflexology and acupuncture. Wu and Lu[41] stated that cupping therapy is simple and easy to use and also has

Table 4: Comparison of fatigue scores and quality of life in patients with multiple sclerosis after the intervention between the two groups by using analysis of covariance

Variables	Group	Mean (SD)	(95% CI) Mean difference	*F**	*P*
Fatigue					
	Control group	46.85 (8.95)	(16.21 and 8.53)	26.22	<0.001
	Intervention group	34.4 8 (6.16)		13.19	
Quality of life					
	Control group	74.37 (14.22)	(4.91 and 12.27)	21.84	<0.001
	Intervention group	54.74 (9.78)		8.59	

*The score was checked before the intervention and is listed in the table

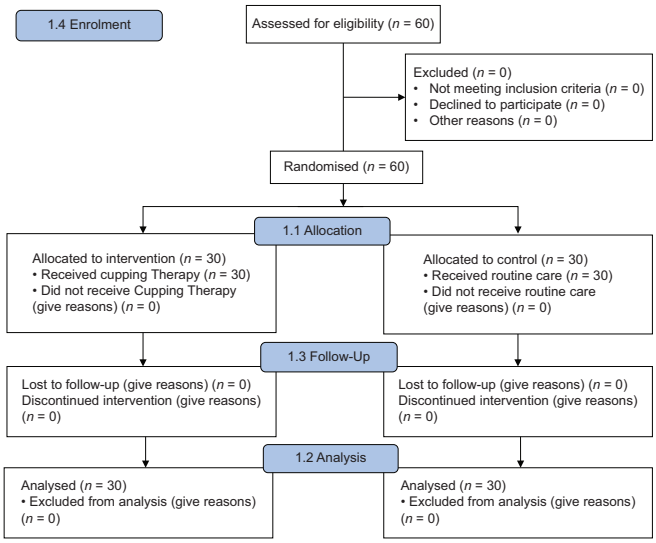

Figure 1: Flowchart of participants' progress through the phases of the study

a reliable therapeutic effect without side effects; thus, it should be used alongside modern medicine.

The results also indicated that cupping therapy had a positive effect on QOL in women with MS. No similar study was found in patients with MS. However, the effect of cupping therapy and other QOL complementary therapies on other diseases has been evaluated. Lauche *et al*.[42] in Germany studied the effect of cupping therapy on the improvement of symptoms and QOL in patients with fibromyalgia syndrome. Their results showed that cupping therapy is more effective than conventional care in relieving pain intensity and improving QOL.

Al Jaouni *et al*.[43] conducted a study to evaluate the effect of wet cupping therapy on the QOL of adults with chronic diseases in Saudi Arabia. The QOL was assessed using the World Health Organization Quality of Life Questionnaire (WHOQOL-BREF) before and 1 month after the intervention. The results indicated the promising effects of wet cupping on improving QOL in these patients. The results of a study conducted by Wu and Lu[41] on the effectiveness of Tuina (use of massage and acupressure in different parts of the body) and cupping therapy in patients with chronic fatigue syndrome showed that this method in patients with chronic fatigue syndrome has a significant effect on relieving fatigue and improving QOL. It should be noted that the Tuina method has side effects such as mild and persistent headache, mild pain, mild stomach upset, increased frequency of urination, drowsiness, and bruising,[46] while cupping therapy does not have these side effects. Kordafshari *et al*.[33] reported that wet cupping can improve healthy individuals' QOL.

A study by Zhao *et al*.[47] on the QOL of patients with osteoporosis found that combining acupuncture with cupping improves QOL in patients with osteoporosis. In Yang *et al*.'s[48] study that investigated the effect of pulsatile cupping on body pain and QOL in people with below-average health status in Beijing, the findings showed that pulsatile cupping can have a favorable effect on relieving body pain and QOL in patients with less than average health status, compared to traditional cupping.

Overall, the use of cupping therapy has been able to increase QOL in patients.

One of the unavoidable limitations of this study was Individual differences and the patient's previous beliefs and mentality about the intervention. We tried to obtain patients' cooperation by explaining the effects of dry cupping therapy before the intervention. Another limitation of this study was not using a sham group. Therefore, the effect of placebo and cupping therapy on patients with MS can be evaluated in the future.

Conclusion

The results of this study indicated that cupping therapy had a positive effect on the fatigue and QOL of women with MS. Cupping therapy is a low-cost, accepted, and relaxing procedure that can be done with little equipment and partial training; thus, nurses and caregivers of MS patients can use it to reduce fatigue and improve the QOL of MS patients.

Nurses have a unique opportunity to provide services that facilitate wholeness. They must understand all aspects of complementary medicine, including costs, patient knowledge, and drug interactions, to promote holistic strategies for patients seeking a higher QOL. The awareness of incorporating complementary medicine in the existing curricula of nursing has increased in recent years. Increasing knowledge regarding complementary medicine

among healthcare professionals may lead to a more open and positive attitude toward these treatment modalities. This awareness may help promote a culture in which patients feel comfortable disclosing the use of complementary medicine to healthcare professionals, thus allowing monitoring of adverse drug effects and/or interactions, as well as the delivery of culturally competent care.

The sampling was limited to the MS center in Kerman; thus, the generalization of the results to people outside the research community should be done with caution. In addition, potential factors (e.g., disease severity and treatment adherence) may influence treatment outcomes.

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Conflicts of interest

Nothing to declare.

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