

ORIGINAL RESEARCH ORJİNAL ARAŞTIRMA

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Comparison of the Effectiveness of Physical Therapy Modalities and Wet Cupping Treatments in Knee Osteoarthritis: A Randomized Controlled Study

Diz Osteoartritinde Fizik Tedavi Modaliteleri ve Yaş Kupa Tedavisinin Etkinliğinin Karşılaştırılması: Randomize Kontrollü Çalışma

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ABSTRACT Objective: There is increasing interest in complementary treatment methods for knee osteoarthritis. There are a limited studies on the effectiveness of cupping therapy, in treating knee osteoarthritis. This study aimed to compare the short- and medium-term effectiveness of physical medicine and rehabilitation, wet cupping and exercise therapies in the treatment of knee osteoarthritis in relieving pain and improving physical function. **Material and Methods:** Ninety patients with knee osteoarthritis were divided into 3 groups (n=30 per group). The 1st group received physical therapy and rehabilitation for 15 sessions, and the 2nd group received wet cupping therapy for 2 sessions 15 days apart. The 1st and 2nd groups were also given 12 weeks of home exercise therapy. Patients in the 3rd group were given a home exercise treatment program for 12 weeks. To compare the effects of therapies, visual analogue scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), range of motion (ROM) and Timed Up and Go (TUG) scores, which have important predictive values in knee osteoarthritis, were evaluated. **Results:** All three treatments improved the majority of the scores investigated at both week 4 and week 12. Cupping treatment was more effective than other treatments in terms of the VAS-rest score, VAS-movement score, WOMAC-stiffness score, WOMAC-total score, ROM-active score, and ROM-passive score in the 4th week. This effect continued for the WOMAC-total and ROM-passive parameters in the 12th week. **Conclusion:** Wet cupping treatment is more favorable than physical therapy in terms of fewer treatment sessions and better outcomes. Therefore, wet cupping therapy can be used effectively as an alternative to physical therapy in patients with knee osteoarthritis where possible.

Keywords: Cupping therapy; exercise; health; knee osteoarthritis; physical therapy modalities

ÖZET Amaç: Diz osteoartriti tedavisinde tamamlayıcı tedavi yöntemlerine olan ilgi artmaktadır. Kupa terapisinin diz osteoartriti tedavisindeki etkinliği hakkında sınırlı sayıda çalışma bulunmaktadır. Bu çalışma, diz osteoartriti tedavisinde fiziksel tıp ve rehabilitasyon, yaş kupa ve egzersiz terapilerinin ağrıyı hafifletme ve fiziksel işlevi iyileştirmedeki kısa ve orta vadeli etkinliğini karşılaştırmayı amaçlamaktadır. **Gereç ve Yöntemler:** Diz osteoartriti olan 90 hasta 3 gruba ayrıldı (her grupta 30 hasta). Birinci grup 15 seans fizik tedavi ve rehabilitasyon aldı ve 2. grup 15 gün arayla 2 seans yaş kupa terapisi aldı. Birinci ve 2. gruplara ayrıca 12 haftalık ev egzersiz terapisi verildi. Üçüncü gruptaki hastalara 12 haftalık bir ev egzersiz tedavisi programı verildi. Tedavi etkinliklerini karşılaştırmak için diz osteoartritinde önemli öngörü değerleri olan görsel analog ölçeği (GAÖ), [Western Ontario ve McMaster Üniversiteleri Artrit İndeksi (WOMAC)], eklem hareket açıklığı (EHA) ve [Zamanlanmış Kalk ve Git Testi (TUG)] skorları değerlendirildi. **Bulgular:** Her üç tedavi de hem 4. haftada hem de 12. haftada araştırılan skorların çoğunu iyileştirdi. Kupa tedavisi 4. haftada VAS-dinlenme skoru, VAS-hareket skoru, WOMAC-sertlik skoru, WOMAC-toplam skoru, ROM-aktif skoru ve ROM-pasif skoru açısından diğer tedavilerden daha etkiliydi. Bu etki 12. haftada WOMAC-toplam ve ROM-pasif parametreleri için devam etti. **Sonuç:** Yaş kupa tedavisi daha az tedavi seansı açısından ve daha iyi sonuçlar vermesiyle fizik tedaviden daha uygundur. Bu nedenle mümkün olan durumlarda yaş kupa tedavisi diz osteoartriti olan hastalarda fizik tedaviye alternatif olarak etkili bir şekilde kullanılabilir.

Anahtar Kelimeler: Kupa terapisi; egzersiz; sağlık; diz osteoartriti; fizik tedavi modaliteleri

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The most affected joint in osteoarthritis (OA) patients is the knee joint. Knee osteoarthritis (KOA) is a disease with high prevalence, disability, and significant socioeconomic burden. As the disease progresses, the pain becomes constant and widespread.¹ Pain and functional impairment in patients with KOA are related to multifactorial degenerative intra-articular cartilage, bone and synovial knee structures. Heterogeneous pain mechanisms may explain the variable responses to different treatments. Therefore, the search for effective nonsurgical treatments continues.²

Treatment goals for OA include reducing pain, increasing joint mobility, treating dysfunction and improving quality of life. For the treatment of KOA, complementary treatment methods are used as well as nonpharmacological (physical therapy, exercise), pharmacological, regenerative [prolotherapy, platelet rich plasma (PRP)] and surgical options.³ Exercise is a safe treatment for KOA that improves symptoms, mobility, and quality of life. Knee replacement for advanced OA is effective but costly. Therefore, a safe and effective treatment option that complements current conservative treatment remains a top priority in clinical practice and research. Both physical therapy modalities and exercise treatments are frequently used to treat KOA. There are data that physical therapy modalities and exercise are especially effective in treating KOA.⁴ Exercise forms one of the cornerstones of overall treatment. Physical therapy methods include hot water bottles (hotpacts), ultrasound (US) and transcutaneous electrical nerve stimulation (TENS).

TENS is frequently used.⁵ Intermittent US is more effective than continuous US in both reducing pain and improving function.⁶ While intermittent US causes nonthermal effects, it causes warming in the tissues, albeit slightly. There are also some studies on the positive effects of low-intensity pulsed US on cartilage repair. TENS is a physical modality commonly used to relieve pain in patients with KOA. Although several types of electrical stimulation are available, the most commonly performed method is conventional TENS.⁷ Wet cupping therapy (cupping) is an important part of complementary medicine.⁸ Wet cupping (Hijamah) is the most prominent therapy in Prophetic Medicine. Patients' widespread belief that treatment will have positive effects will also increase

the chance of a cure.⁹ It is widely used in East Asia, the Middle East, and Central and Northern Europe for the treatment of chronic musculoskeletal diseases, especially KOA. There are few studies investigating the effects of wet cupping therapy, a complementary treatment for the treatment of KOA, on pain and physical function, and more studies including different treatment groups are needed.¹⁰ However, since no studies in the literature have compared the effectiveness of traditional physical therapy modalities and wet cupping treatment in treating KOA, this study was conducted.

MATERIAL AND METHODS

The study was conducted at the Physical Medicine and Rehabilitation and Family of Medicine Departments of the Faculty of Medicine, and Acupuncture and Complementary Medical Methods Application and Research Center of Atatürk University.

ETHICS

This study was approved by the Clinical Research Ethics Committee of the Faculty of Medicine of Atatürk University (December 30, 2021, no: 44). All procedures were in accordance with the Helsinki Declaration 2008 principles. Verbal and written informed consent were obtained from all patients prior to study.

SAMPLE SIZE CALCULATION

The minimum number of patients required for the study was calculated via the G*Power (version 3.1.9.4, Heinrich-Heine-University Düsseldorf, Düsseldorf, Germany) sample calculation program. Since no similar study with the planned study protocol was found in the literature, the minimum number of patients required for the study was calculated by entering the following inputs into the program: Type I error (α): 0.05, power ($1-\beta$): 0.92, effect size: 0.4 (large effect size), and one-way analysis of variance (ANOVA) test. Accordingly, the minimum sample size was calculated as 30 for each group and 90 in total.

Patients and Groups

Ninety OA patients were randomly divided into 3 groups, with 30 patients in each group. The 1st group

was the physical therapy and rehabilitation (PTR) group, the 2nd group was the wet cupping group, and the 3rd group was the home-based exercise group.

Group 1 (Physical therapy and rehabilitation group): Routine physical therapy and home programmed exercise therapy were applied once a day, with 5 sessions per week for 3 weeks and 15 sessions in total. Depending on the patient's condition, physical therapy was applied to one knee if there was pain in one knee, to the most painful knee if there was pain in both knees, or to the knee, which the patient preferred if both were very painful. The physical therapy modalities included a hot water bag (hotpack) for 20 minutes, 1 MHz, 2 W/cm², low-intensity pulsed ultrasound (LIPUS) with a duty cycle of ¼ for 5 minutes, and TENS with a frequency of 60-100 Hz for 20 minutes in each session. A routine home exercise program was also given.

Group 2 (Wet cupping group): The wet cupping group received 2 sessions of wet cupping therapy at 15-day intervals in addition to routine exercise therapy. Depending on the patient's condition, physical therapy was applied to one knee if there was pain in one knee, to the most painful knee if there was pain in both knees, or to the knee, which the patient preferred if both were very painful.

Group 3 (Home-based exercise group): The third group was given only a home exercise treatment program for 12 weeks. The study design is summarized in Figure 1.

Wet cupping therapy was applied to the EX-LE 4, ST 34,35,36 acupuncture points on the knee of each patient in group 2. Before starting wet cupping therapy, the knee area was disinfected with alcohol (Figure 2). First, the application points were determined while the knee was in flexion, and then wet cupping was performed while the knee was in extension. Three disposable sterile cups were placed on EX-LE 4, ST 34, 35, and 36 acupuncture points (Figure 3). After the cups were left there for 3-5 minutes, each cup was removed in turn, the relevant area was sterilized, and vertical superficial incisions were made in the cup area with a number 15 scalpel. The cups were then placed back on the same points. This process was repeated 3 times by draining the blood and placing the cup again without making a new incision. The process took approximately 20 minutes. At the end of the process, the cups were removed, and the relevant area was cleaned and closed. The patients were followed up immediately after the treatment and at the end of 1 month in terms of possible side effects related to wet cupping therapy. Both the patients in the 3rd group (the control group) and the 2nd group (the wet cupping group) were allowed to use paracetamol if needed for 1 month, and their use was recorded.

Home-based exercise group: Patients in both the 3rd group (the control group) and the 2nd group (the wet cupping group) were given a routine KOA home exercise program applied in our clinic. In this program, isometric and isotonic exercises were applied

PTR Group	Wet Cupping Group	Exercise Group
<ul style="list-style-type: none"> ● PTR was applied once a day, 5 sessions per week for 3 week, 15 sessions in total ● Home-based exercise program 	<ul style="list-style-type: none"> ● Wet cupping therapy was applied for 2 sessions at 15 day intervals ● Home-based exercise program 	<ul style="list-style-type: none"> ● Home-based exercise program for 12 weeks

FIGURE 1: Study design and groups
PTR: Physical therapy and rehabilitation



FIGURE 2: ST 34, ST 35, EX-LE 4, and ST 36 acupuncture points on the knee
 1) ST34: 2 cm above the superior medial border of the patella when the knee is extended
 2) ST35: Under the patella when the knee is extended, in the depression medial to the patella ligament (or under the patella when the knee is extended, medial to the patella ligament)
 3) EX-LE4: Under the patella when the knee is extended, in the depression lateral to the patella ligament (or under the patella when the knee is extended, lateral to the patella ligament)
 4) ST36: 3 cm below ST35, intersection point 1 cm medial to the anterior surface of the tibia



FIGURE 3: Wet cupping application to EX-LE 4, ST 34, 35, 36 acupuncture points on the knee

to strengthen the quadriceps muscle and improve the range of motion. The exercises were given 2 sessions per day for 12 weeks. The exercises were demonstrated in practice, and the patients were also given an exercise form. Each movement was applied to the right knee 10 times, counting to 10, and then to the left knee after relaxing for a few seconds. The outcome parameters reflecting pain and function were visual analogue scale (VAS-rest, VAS-movement, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)-stiffness, WOMAC-function, WOMAC-total, range of motion (ROM- active, ROM-passive, and Timed Up and Go (TUG)) scores.

STATISTICAL ANALYSES

Statistical analyses were performed via SPSS version 25.0 (SPSS, Chicago, IL, USA) and GraphPad Prism 10.2.3 (demo) (GraphPad Software, Inc., United States) package programs. The conformity of the data to a normal distribution was determined via the Kolmogorov-Smirnov test. Descriptive statistics are presented as the means±standard deviations. p values <0.05 at the 95% confidence interval were considered statistically significant. One-way ANOVA was used to compare the values of the physical therapy, wet cupping and home exercise therapy groups. Tukey's test was used for "post hoc" comparisons via one-way ANOVA. One-way ANOVA was used for repeated samples to compare the initial, 4-week and 12-week values of the same group. The Bonferroni correction was used for "post hoc" comparisons of baseline, 4-week and 12-week values.

RESULTS

The demographic and clinical characteristics of the patients are shown in Table 1. There were no significant differences in terms of age, sex, body mass index (BMI), or diagnosis period among the groups ($p<0.05$ for all parameters).

In the physical therapy group, 18 patients (60.0%) received physical therapy on the right knee, and 12 patients (40.0%) received physical therapy on the left knee. In the wet cupping therapy group, 19 patients (63.3%) received wet cupping on the right knee, and 11 patients (36.7%) received wet cupping on the left knee.

TABLE 1: Demographic and clinical characteristics of the patients

Characteristics	PTR group (n=30)	Wet cupping group (n=30)	Exercise group (n=30)	p value
Age (years)	52.4±3.7	51.3±7.0	54.5±8.0	0.159
Gender (female), n (%)	22 (73.3%)	22 (73.3%)	25 (83.3%)	0.572
BMI (kg/m ²)	32.7±5.1	30.9±7.2	32.2±5.4	0.492
Diagnosis period (months)	38.6±27.7	35.7±31.7	27.9±30.2	0.376

p=One-way ANOVA test, p value; PTR: Physical therapy and rehabilitation; BMI: Body mass index

TABLE 2: VAS scores of the treatment groups and comparisons

	Group			
	PTR group (n=30)	Wet cupping group (n=30)	Exercise group (n=30)	p value
VAS-rest				
Baseline	6.70±1.80	7.20±1.29	5.57±2.62	0.007**
4 th week	-1.43±1.69	-3.03±1.54	-0.40±1.61	^a 0.006**
12 th week	-1.40±2.58	-2.43±1.67	-1.57±1.59	^a 0.001**
p value	<0.01**	<0.01**	<0.01**	^b 0.046*
Baseline-4 th week	^a 0.01**	^a <0.01**	^a 0.552	^c <0.01**
Baseline-12 th week	^a 0.018*	^a <0.01**	^a <0.01**	
4 th week-12 th week	^f 1.000	^f <0.01**	^f <0.01**	
VAS-movement				
Baseline	8.53±1.69	8.67±1.32	8.17±1.23	0.379
4 th week	-1.43±0.97	-2.80±1.40	-1.67±1.95	0.01**
12 th week	-1.83±1.39	-2.27±1.57	-2.20±1.56	^a 0.002**
p value	<0.01**	<0.01**	<0.01**	^c 0.013*
Baseline-4 th week	^d <0.01**	^d <0.01**	^d <0.01**	
Baseline-12 th week	^e <0.01**	^e <0.01**	^e <0.01**	
4 th week-12 th week	^h 0.015*	^h <0.01**	^h 0.080	

The baseline values are expressed as the means±standard deviations, and the 4-week and 12-week values are expressed as differences from the baseline values. p=One-way ANOVA test statistic p value (comparing different columns) and repeated measures p value for one-way ANOVA test statistic (comparing time effects in the same column).

^{a,b,c}Indicates the significant (p<0.05) p values of the post hoc Tukey test results of the one-way ANOVA test (comparison of different columns); ^aSignificant difference in comparison of PTR and wet cupping groups; ^bSignificant difference in comparison of PTR and exercise groups; ^cSignificant difference in comparison of wet cupping and exercise groups. ^{d,e,f}Indicates significant differences (p<0.05) in the results of the Bonferroni correction of repeated measurements for the one-way ANOVA test (significant difference in the comparison between baseline and the 4th week; ^eSignificant difference in the comparison between baseline and the 12th week; ^fSignificant difference in the comparison between the 4th week and the 12th week).

*p<0.05; **p<0.01; PTR: Physical therapy and rehabilitation; VAS: Visual analogue scale

TABLE 3: WOMAC scores of treatment groups and comparisons

	Groups			
	PTR group (n=30)	Wet cupping group (n=30)	Exercise group (n=30)	p value
WOMAC-stiffness				
Baseline	3.60±2.29	3.70±2.46	4.43±1.97	0.300
4 th week	-1.20±2.53	-1.77±1.81	-0.37±1.42	0.026*
12 th week	-0.90±3.36	-1.37±1.32	-1.00±1.53	^a 0.022*
p value	0.003**	<0.01**	0.003**	0.704
Baseline-4 th week	^d 0.045	^d <0.01**	^d 0.509	
Baseline-12 th week	^e 0.462	^e <0.01**	^e 0.004**	
4 th week-12 th week	^h 0.666	^h 0.077	^h 0.014*	
WOMAC-function				
Baseline	36.80±14.09	36.47±15.47	38.23±15.16	0.888
4 th week	-17.33±12.66	-16.57±12.58	-5.90±9.23	<0.01**
12 th week	-19.53±15.16	-14.73±13.32	-9.53±8.62	^b 0.01**
p value	<0.01**	<0.01**	<0.01**	^c 0.002**
Baseline-4 th week	^d <0.01**	^d <0.01**	^d 0.05*	^h 0.009**
Baseline-12 th week	^e <0.01**	^e <0.01**	^e <0.01**	
4 th week-12 th week	^h 0.039*	^h 0.003**	^h 0.006**	
WOMAC-total				
Baseline	53.06±20.02	55.52±21.07	54.62±21.34	0.899
4 th week	-19.91±14.21	-24.69±17.01	-7.90±13.67	<0.01**
12 th week	-24.25±20.76	-21.81±17.88	-13.43±12.94	^b 0.008**
p value	<0.01**	<0.01**	<0.01**	0.047*
Baseline-4 th week	^d <0.01**	^d <0.01**	^d <0.01**	^h 0.049
Baseline-12 th week	^e <0.01**	^e <0.01**	^e <0.01**	
4 th week-12 th week	^h 0.061	^h 0.001**	^h 0.004**	

The baseline values are expressed as the means±standard deviations, and the 4-week and 12-week values are expressed as differences from the baseline values. p=One-way ANOVA test statistic p value (comparing different columns) and repeated measures p value for one-way ANOVA test statistic (comparing time effects in the same column).

^{b,d,e,f}Indicates the significant (p<0.05) p values of the "post hoc" Tukey test results of the one-way ANOVA test (comparison of different columns); ^bSignificant difference in comparison of PTR and exercise groups; ^cSignificant difference in comparison of wet cupping and exercise groups. ^{d,e,f}Indicates significant differences (p<0.05) in the results of the Bonferroni correction of repeated measurements for the one-way ANOVA test (significant difference in the comparison between baseline and the 4th week; ^eSignificant difference in the comparison between baseline and the 12th week; ^fSignificant difference in the comparison between the 4th week and the 12th week).

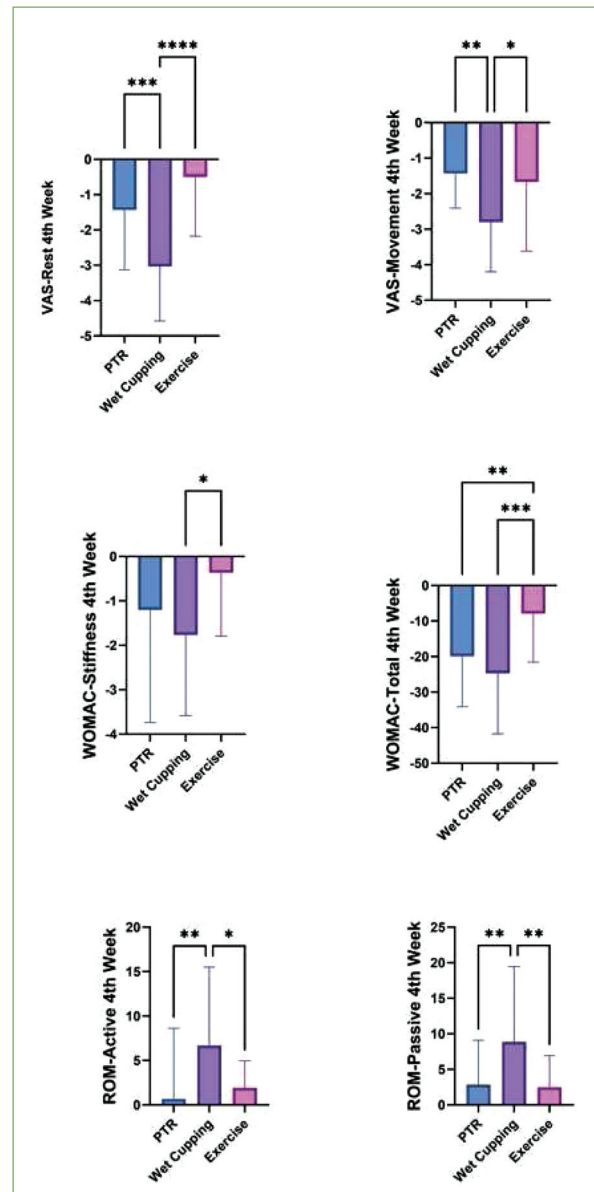
*p<0.05; **p<0.01; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; PTR: Physical therapy and rehabilitation

TABLE 4: ROM-Active, ROM-Passive, and TUG scores of the groups

	Group			
	PTR group (n=30)	Wet cupping group (n=30)	Exercise group (n=30)	p value
ROM-Active				
Baseline	122.0±11.8	121.0±11.5	124.6±13.9	0.504
4 th week	+0.6±7.9	+6.6±8.8	+1.9±3.0	^{a,c} <0.04*
12 th week	+3.0±10.6	+8.8±13.4	+2.6±4.0	^c 0.035*
p value	0.327	0.01**	0.005**	
Baseline-4 th week	1.00	^c 0.01*	^c 0.006**	
Baseline-12 th week	0.40	^c 0.04*	^c 0.004**	
4 th week-12 th week	0.698	0.471	0.201	
ROM-Passive				
Baseline	127.0±8.6	123.0±10.9	128.9±10.0	0.067
4 th week	-3.7±2.7	+7.5±3.8	+2.4±4.4	^{a,c} <0.002**
12 th week	2.3±11.8	+11.1±9.8	+3.9±5.1	^{a,c} <0.001**
p value	<0.01**	<0.01**	0.01**	
Baseline-4 th week	0.116	^c 0.01**	^c 0.015*	
Baseline-12 th week	1.00	^c <0.01**	^c 0.01**	
4 th week-12 th week	^c 0.001**	^c 0.15*	^c 0.023*	
TUG				
Baseline	11.3±1.5	11.7±3.3	12.3±2.8	0.381
4 th week	-0.6±0.6	-1.1±0.8	-0.8±0.5	0.275
12 th week	-1.1±1.7	-1.0±0.9	-0.6±0.5	0.090
p value	0.065	0.002**	0.011*	
Baseline-4 th week	0.177	^c 0.003	0.007**	
Baseline-12 th week	0.056	^c 0.005	0.046*	
4 th week-12 th week	0.232	0.200	0.632	

The baseline values are expressed as the means±standard deviations, and the 4-week and 12-week values are expressed as differences from the baseline values. p=One-way ANOVA test statistic p value (comparing different columns) and repeated measures p value for one-way ANOVA test statistic (comparing time effects in the same column). ^{b,c}Indicates the significant (p<0.05) p values of the "post hoc" Tukey test results of the one-way ANOVA test (comparison of different columns); ^bSignificant difference in comparison of pTR and exercise groups; ^cSignificant difference in comparison of wet cupping and exercise groups. ^{d,e,f}Indicates significant differences (p<0.05) in the results of the Bonferroni correction of repeated measurements for the one-way ANOVA test ^d(significant difference in the comparison between baseline and the 4th week, ^eSignificant difference in the comparison between baseline and the 12th week, ^fSignificant difference in the comparison between the 4th week and the 12th week). *p<0.05; **p<0.01; PTR: Physical therapy and rehabilitation; TUG: Timed up and go; ROM: Range of motion

Table 2 shows the VAS scores, Table 3 shows the WOMAC scores, and Table 4 shows the ROM and TUG scores of the patients. Compared with other therapies, wet-cupping therapy was superior in terms of the VAS-rest score, VAS-movement score, WOMAC-stiffness score, WOMAC-total score, ROM-active score, and ROM-passive parameters at the 4th week (Figure 4). This effect continued for the

**FIGURE 4:** Results at the 4th week

*p<0.05; **p<0.01; ***p<0.001; ****p<0.0001; VAS: Visual analog scale; PTR: Physical therapy and rehabilitation; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; ROM: Range of motion

WOMAC-total and ROM-passive parameters at the 12th week (Figure 5).

DISCUSSION

To the best of our knowledge, this is the first randomized trial evaluating the effects of wet cupping and PTR compared with exercise therapy in KOA patients. The most prominent results were as follows:

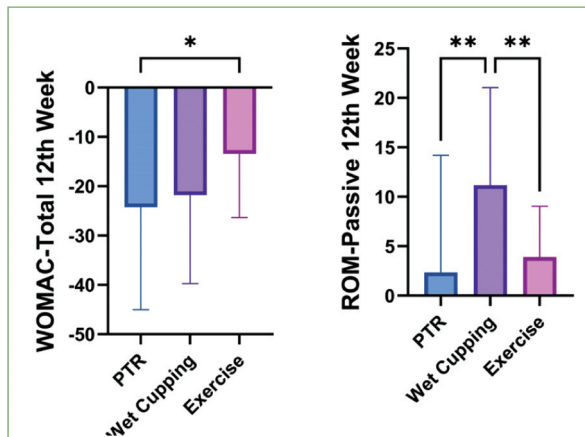


FIGURE 5: Results at the 12th week

* $p < 0.05$; ** $p < 0.01$; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; PTR: Physical therapy and rehabilitation

VAS movement scores and Western Ontario and McMaster Universities Osteoarthritis Index Function (WOMAC-F) and Western Ontario and McMaster Universities Osteoarthritis Index Total (WOMAC-T) scores were significantly lower in all 3 treatment groups than at baseline. Western Ontario and McMaster Universities Osteoarthritis Index Stiffness (WOMAC-S) score decreased significantly only in the wet cupping group at week 4. Compared with those at baseline, the VAS score, VAS score, WOMAC-F score, and WOMAC-T score were significantly lower in all the treatment groups at week 12. Compared with that at baseline, the WOMAC-S score decreased significantly only in the wet cup group at week 12. In both the cup and exercise groups, improvements were observed in TUG scores at weeks 4 and 12 compared with baseline. However, wet cupping and exercise therapy were not superior in improving TUG scores. In addition, physical therapy did not improve the TUG score. In both the wet cupping and exercise groups, improvements were observed in ROM active scores at weeks 4 and 12 compared with baseline, and cupping therapy was superior to exercise therapy. In the physical therapy group, improvement in the ROM active score was observed only at the 12th week compared with baseline. Cupping therapy was more effective than exercise and physical therapy in improving ROM passive scores at the 4th and 12th weeks. When the effectiveness of each group was examined within itself, phys-

ical therapy improved the ROM score only at the 12th week, whereas cupping and exercise had positive effects at the 4th and 12th weeks.

PTR practices are known to be effective for improving pain relief and functional status in patients with KOA and are widely used in patients with KOA worldwide.³ The study program for our patients in the PTR group included a hot water bag (hotpack), low-intensity pulsed ultrasound (CUS), TENS, and home exercises. Exercise therapy is a low-risk, safe way to treat this condition and has been demonstrated to enhance knee function, reduce discomfort, and postpone the progression of the disease.¹¹ Hospital-oriented exercise interventions require specialized rehabilitation equipment and are carried out under the guidance of physiotherapists.⁵ On the other hand, home-based exercise interventions often provide advantages in terms of patient transportation, time, and cost. As the most important disadvantage, it is not possible to check whether home-based programs are performed regularly by patients at home. However, home-based exercise interventions are important in encouraging patients to adopt home exercises as a lifestyle and maintain long-term benefits.¹² Both hospital-based and home-based exercise interventions aim to increase function and reduce discomfort by increasing range of motion, neuromuscular control, and strength in the lower limb muscles of afflicted knees.¹² In our study, we found that PTR and home-based exercise therapies were both effective at improving all the parameters in the 12th week.

Our results showed that 4 weeks of home-based exercise intervention was not enough to improve the VAS-rest and WOMAC-S scores. However, 12 weeks of home-based exercise therapy effectively improved all the parameters. In contrast, 3 weeks of PTR was enough to improve all the parameters. This may be because although the patients stated that they were doing home-based exercises regularly, they were not yet able to do this in the 4th week. Again, we suggest that PTR is more effective than home-based exercise interventions for short durations (3-4 weeks).

However, as our main aim was to compare the efficacy of wet-cupping therapy with that of exercise

therapies, we focused on the results of wet-cupping. One study reported that dry cupping was effective in improving KOA symptoms compared with the control group, as demonstrated by the WOMAC, SF-36 physical component scale score, and VAS.¹³ With this, the researchers concluded that they were not sure if cupping of the knee or the lumbosacral area alone or even sham cupping would be as effective because they had combined cupping on the lower back and knee region.

Wet cupping has been used in the complementary treatment of various diseases.¹⁴ For example, myofascial pain syndrome is another painful disease. Wet cupping has shown favorable effects on improving the VAS score, Nottingham health profile and Beck Depression Index in myofascial pain syndrome patients. A reduction in lactic acid levels in patients after wet cupping may help relieve pain.¹⁵

A recent systematic review and meta-analysis including 7 research articles reported that there is insufficient evidence to support the claim that cupping therapy can improve the physical function and treatment efficacy of KOA patients (as demonstrated by improvements in pain, stiffness, and WOMAC scores but not in VAS scores).¹⁶ When the abovementioned meta-analysis was performed for wet cupping studies, 4 research articles including 390 patients were included in the meta-analysis, and favorable statistically significant effects of wet cupping therapy were reported to be supported by the response rate and Lequesne algofunctional index. In both cases, the small number of included studies and small sample sizes should be considered.¹⁶ The fact that the follow-up period for 3 included trials was less than 1 month led us to focus on the original studies rather than the results of this meta-analysis. Three of the studies were not English language available, and we evaluated the remaining studies. A study conducted by WangQiang demonstrated that the combined treatment of wet cupping with oral glucosamine hydrochloride improved the degree of pain and the Lequesne index 6 weeks after treatment, which continued during the follow-up after 1 year.¹⁷

The neurobiological basis of naturopathic reflex therapies is attributed to several potential mechanisms of action, such as stimulating A β fibers in

painful skin regions, stimulating inhibitory receptive fields of the multireceptive dorsal horn neurons, and creating a relaxing and socially comforting effect on the patient, modulating inflammatory reactions, and regulating the immune system by removing oxidants and decreasing natural killer cell cytotoxicity.¹⁸⁻²¹

All the suggested mechanisms may have been effective in patients who underwent wet cupping therapy in this study, supported by evidence of pain relief and improvement in physical function.

The strengths of this study are as follows: This is the first study in the literature comparing PTR, wet cupping and exercise treatments. Second, we were able to compare both the acute and chronic effects of the treatments. However, this study has several limitations: There was a significant difference between the baseline VAS-rest scores of the groups. The lowest VAS-rest score was in the exercise group. However, we believe that we have reduced the impact of this limitation by comparing the differences from the baseline when evaluating treatment effectiveness.

CONCLUSION

When all the results were evaluated, the PTR, wet cupping and exercise treatments were all effective for many of the parameters evaluated in patients with OA. In addition, only wet cupping therapy was effective in improving the WOMAC-S score. This effect, which was observed in the 12th week, continued in the 12th week. Wet cupping therapy is more advantageous than physical therapy because it involves fewer treatment sessions. Therefore, wet cupping therapy can be used effectively as an alternative to physical therapy in the treatment of KOA when the possibilities are sufficient.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members

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