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POLISH JOURNAL OF PHYSIOTHERAPY

OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

NR 2/2020 (20) KWARTALNIK ISSN 1642-0136

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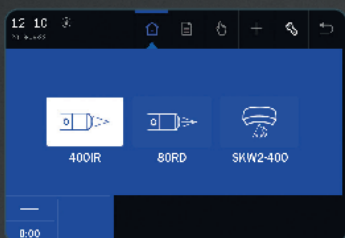
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ZASTOSOWANIE:

TERAPIA POWAŻNYCH KONTUZJI I USZKODZEŃ MIĘŚNI

Głęboka Oscylacja doskonale sprawdza się w leczeniu poważnych kontuzji i uszkodzeń, które są efektem naciągnięcia mięśni i ścięgien.

Głęboka oscylacja z powodzeniem jest stosowana także po treningu: bardzo szybko relaksuje mięśnie, redukuje ból i skutecznie chroni przed mikro-urazami. Stymuluje komórki, dzięki czemu produkty przemiany materii zostają szybciej wydalone przez organizm. Wszystko to sprawia, że organizm znacznie szybciej się regeneruje i pacjent w krótszym czasie wraca do pełnej sprawności.

REDUKCJA OBRZĘKÓW

Głęboka Oscylacja stymuluje przepływ limfy, dzięki temu zbędne produkty przemiany materii jak i płyny zalegające w obrzękach zostają przetransportowane i wydalone. Dlatego w przypadku stosowania DEEP OSCILLATION® obrzęki wchłaniają się znacznie szybciej niż ma to miejsce w przypadku stosowania tradycyjnych zabiegów.

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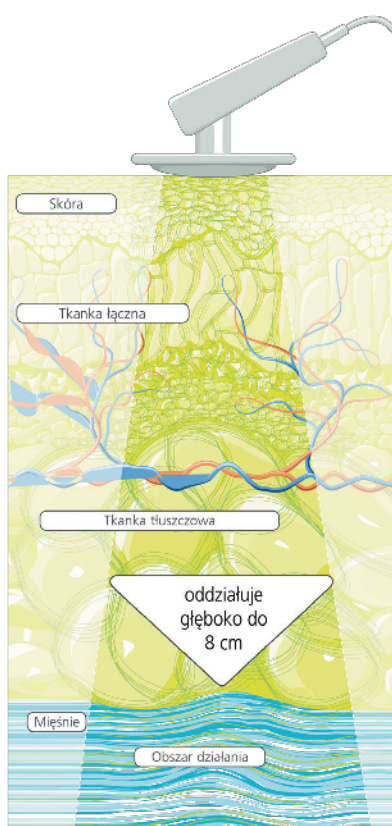
Badania naukowe potwierdziły, że Głęboka Oscylacja ma istotny wpływ na zdolność podejmowania powtarzalnych wysiłków siłowych. Zastosowanie głębokiej oscylacji zwiększa wytrzymałość siłową, obniża powysiłkowy ból mięśniowy oraz napięcie mięśniowe a także wypłukuje z krwi biochemiczne markery zmęczenia mięśniowego. Najkorzystniejsze efekty uzyskuje się stosując Głęboką Oscylację natychmiast po zmęczeniu.

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WZMACNIANIE ORGANIZMU

Głęboka oscylacja stymuluje miejscowy układ odpornościowy. Badania kliniczne potwierdziły, że terapia z wykorzystaniem Głębokiej Oscylacji zapobiega również powstawaniu infekcji.



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Efficiency of Siwan Traditional Therapy on Pulmonary Functions of Rheumatoid Arthritis Patients: A Pilot Study and A Randomized Controlled Trial

Wpływ ćwiczeń aerobowych na sen i poziom hormonów u osób starszych z przewlekłą pierwotną bezsennością: Randomizowane badanie kontrolowane

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Abstract

Objectives. To compare the effect of Siwan traditional therapy versus physiotherapy on pulmonary function and pain in rheumatoid arthritis (RA). **Design.** A Pilot study, a prospective, randomized, single-blind, pre-post-test, controlled trial. **Methods.** Eight patients with rheumatoid arthritis according to the American Rheumatism Association criteria 2010 participated in this study. They were randomly assigned into 2 equal groups. Group (A) received Siwan traditional therapy in the form of sand bath for 5 days, followed by massage with olive oil, while group (B) received physiotherapy for 5 sessions in the form of heat application, transcutaneous electrical nerve stimulation (TENS), aerobic and strengthening exercises. Pain severity was measured by visual analogue scale, while pulmonary function was measured by spirometer. **Results.** Comparing both groups post-treatment revealed non-significant differences in pain severity and pulmonary function ($P > 0.05$). However, Siwan therapy improved pain, forced vital capacity (FVC), volume of air exhaled forcefully in the first second (FEV1) and FEV1/FVC by 71.8%, 8.69%, 70.46% and 58.8% compared to traditional physiotherapy (14%, 2.25%, 0% and 2.59% respectively). **Conclusion.** Siwan therapy was associated with greater improvement percentages for pain and pulmonary function than traditional physiotherapy in patients with rheumatoid arthritis.

Key words:

Siwan Traditional Therapy, Pulmonary Functions, Rheumatoid Arthritis

Streszczenie

Cele. Porównanie wpływu tradycyjnej terapii Siwan i fizjoterapii na funkcje płuc i ból w reumatoidalnym zapaleniu stawów (RA). **Projekt.** Badanie pilotażowe, prospektywne, randomizowane, z pojedynczą ślepą próbą, kontrolowane badanie, z uwzględnieniem wyników uzyskanych przed i po badaniu. **Metody.** W badaniu wzięło udział ośmiu pacjentów z reumatoidalnym zapaleniem stawów zdiagnozowanych zgodnie z kryteriami American Rheumatism Association 2010. Uczestnicy zostali losowo przydzieleni do dwóch równych grup. Grupa (A) była poddawana tradycyjnej terapii Siwan w postaci kąpieli piaskowej przez 5 dni, a następnie masażom oliwą z oliwek, podczas gdy grupa (B) była poddawana fizjoterapii w postaci 5 sesji z zastosowaniem ciepła, przezskórnej elektrycznej stymulacji nerwów (TENS), ćwiczeniom aerobowym i wzmacniającym. Intensywność bólu mierzono przy użyciu wizualnej skali analogowej, zaś funkcje płuc mierzono spirometrem. **Wyniki.** Porównanie obu grup po leczeniu ujawniło nieistotne różnice w nasileniu bólu i funkcji płuc ($P > 0,05$). Jednakże, terapia Siwan spowodowała poprawę w zakresie intensywności bólu, natężonej pojemności życiowej (FVC), objętości powietrza wydychanego z dużą siłą w pierwszej sekundzie (FEV1) oraz FEV1/FVC o 71,8%, 8,69%, 70,46% i 58,8% w porównaniu do tradycyjnej fizjoterapii (kolejno 14%, 2,25%, 0% i 2,59%). **Wniosek.** Terapia Siwan wiąże się z większą poprawą w zakresie intensywności bólu i czynności płuc niż tradycyjna fizjoterapia u pacjentów z reumatoidalnym zapaleniem stawów.

Słowa kluczowe:

tradycyjna terapia Siwan, funkcje płuc, reumatoidalne zapalenie stawów

Introduction

Rheumatoid arthritis is a chronic, progressive, inflammatory autoimmune disorder accompanied by articular, extra-articular, and systemic abnormalities. It accounts for 0.5 to 1% of individuals in developed countries during adulthood [1]. It has huge socio-economic burden with total annual social cost of \$19.3 billion and healthcare cost of \$8.4 billion per year [2].

Both genetic and environmental factors have a critical role in RA etiology [3], leading to synovitis, destructive arthritis and extra-articular complications [4]. Around 40% of patients complain of abnormalities in their extra-articular organs at the start or throughout the illness course [5]. The most severe and common extra-articular complication is the pulmonary dysfunction [6].

A previous study evaluated the extra-articular complications in fifty Egyptian patients with RA. It found that 74% of them suffered from disorders in their respiratory systems, with 30% of them having interstitial pulmonary disease (IPD), 16% having COPD, 16% having pleural effusion, 8% having pleurisy, and 2% having Caplan's syndrome [7]. The respiratory complications associated with RA can be caused by many conditions affecting the pleura, parenchyma, airways or blood vessels [8].

Pulmonary function testing of RA patients with interstitial lung disease (RA-ILD) revealed a restrictive pattern, with or without reduced diffusing lung capacity for carbon monoxide (DLCO) and hypoxaemia [9]. Impaired FVC and DLCO are accompanied by poor prognosis. However, a systematic review assessing prognosis of RA-ILD showed that only DLCO was a significant predictor of mortality after controlling for confounders [10]. Obstruction of the airflow may co-exist and be observed in patients having airway manifestations, i.e. bronchiolitis obliterans [8].

Rheumatoid arthritis is associated with disability and handicap [11], in a way that reduced range of motion, impaired strength and endurance of muscles, and lowered aerobic fitness result in significant functional loss, work disability, dependency, reduced family or social function, and impaired quality of life in RA persons [12]. Therefore, physical therapy is essential for management of RA patients, even if they are improved to a great extent by pharmacological therapy over the last decade [13].

Humans have searched for natural therapies for diseases since the beginning of time. Initially, they empirically came to the conclusion about different kinds and underlying mechanisms of natural elements on human being, observing that air, water and soil have unequal therapeutic outcomes [14].

Traditional medicine is used by about 80% of people in Africa as a primary source for health care [15]. Sand therapy (psammo-therapy) represents one of the familiar traditional therapies for a number of disorders, including RA [16].

Sand therapy is one of the traditional therapies in Siwa oasis. Allam et al [17] revealed that Siwan therapy was more valuable in relieving pain and improving functional disability of RA patients than traditional physical therapy. Although sand therapy positively influences different diseases, there is a dearth of knowledge about its effect, underlying mechanism, in-

dications and contraindications. Consequently, further researches are needed in this area to prevent the erosion of traditional knowledge. This study was conducted to investigate the effect of sand therapy as a type of traditional therapy on pulmonary function and pain in RA patients. To our knowledge, it was the first study that assessed the effect of traditional therapy on pulmonary function of RA patients and the second one conducted in Siwa oasis.

Materials and Methods

Study design

The study was designed as a pilot study, a prospective, randomized, single blind, pre post-test, controlled trial. Ethical approval was obtained from the institutional review board at Faculty of physical therapy, Cairo University before study beginning. The study was followed the Guidelines of Declaration of Helsinki on the conduct of human research. The study was conducted between June 2016 and August 2019.

Study participants

A sample of eight patients with RA from both genders was selected from Elkasr Eleiny outpatient clinic, located in Cairo. They were enrolled and assessed for their eligibility to participate in the study. Their age ranged from 29 to 56 y. They were assessed and treated in outpatients clinic in Cairo University and in Siwa oasis, in The Marsa Matrouh Governorate. The inclusion criteria were definite RA that fulfilled the 2010 American College of Rheumatology/European League Against Rheumatism classification criteria for RA [18] with regards of pulmonary symptom. Their age was 29-56 y. Both sexes participated in this study. Patients received stable doses of anti-rheumatic drugs. They had moderate or severe RA with functional status as following: (I) complete functional capacity with ability to conduct all usual activities without handicaps, (II) functional capacity enough to carry out normal duties despite handicap of discomfort or limited mobility of one or more joints, (III) functional capacity enough to perform only a few or none of usual occupational or self-care activities. Patients were excluded if they had uncontrolled arterial hypertension [systolic blood pressure (SBP) of more than or equal to 200 mm Hg and/or diastolic blood pressure (DBP) more than or equal to 120 mm Hg], uncontrolled diabetes, previous renal transplantation, coronary artery disease (e.g. unstable angina) or pregnancy with bleeding disorder. Additionally, largely or wholly incapacitated patients, as well as bedridden or wheel chair bound patients (permitting little or no self-care) were excluded from this study.

Randomization

Following a brief orientation session on the study nature and the tasks to be accomplished, patients were randomly assigned into two equal groups (group A and group B) by a blinded and an independent research assistant who opened sealed envelopes that contained a computer generated randomization card. No dropping out of subjects from the study after randomization, written informed consent was obtained from all participants before the baseline evaluation.

Interventions

Group (A) composed of 4 RA patients who received Siwan traditional therapy in the form of sand bath for 5 days, followed by massage with olive oil. Group (B) composed of 4 RA patients who received physiotherapy for 5 sessions in the form of heat application, TENS, aerobic and strengthening exercises.

Siwan traditional therapy

Group A received Siwan traditional therapy in the form of sand bathing, and massage with olive oil every day for 5 days. Patients received sand bathing at afternoon between 2 pm and 4 pm between the end of May and the first two weeks of December. The atmospheric temperature was 40-45°C, the sand surface temperature ranged from 75 to 82°C and the temperature under the sand surface by 10-20 cm was 50-60°C, measured by an infrared thermometer (Medisana, Germany). A hole of 20-40 cm in depth, 80 cm in width and 100-150 cm in length was dug. A long shallow hole was dug in the early morning to permit the heating of the sand by the sun's rays; after the lying down of the patient, he/she was covered to the neck by hot dry sand from the surface of the desert. The burial lasted approximately 20 min. Once the sand became wet with sweat, it was replaced by fresh hot sand. Next, the patient was wrapped in a towel and remained for 15 min in a well-sealed tent pitched near the burial area. Participants drank liquids to avoid dehydration; drinking water was forbidden at this point. Patients were wrapped to avoid wind or air draft, which might have negative consequences (e.g. muscle stiffness or a pounding). The body returned to the normal temperature and regained its resting status during the time spent in the tent. Then, patients rested in their beds; sweating continued two hours post session; after the sweating stopped, they were allowed to change their clothes with dry ones. Patients were not allowed to take a shower or to use body lotion or cream for three days after treatment, also they were not permitted to use fan or air conditioning, they should cover their bodies well as to prevent air draft and drink lots of hot or warm fluids (e.g. anise and lemon juice).

Physiotherapy

Each participant, in group B, received five sessions of physiotherapy and five sessions of home program. The program included heat application for the most painful areas as reported by the patients for 15 minutes, TENS for another 15 minutes, and aerobic exercises in the form of walking on a treadmill, with moderate intensity ranged from 55-65% of

target heart rate {resting heart rate + (maximum heart rate – resting hart rate)55-65%}[19]; the patient performed intermittent aerobic exercise for 30 min at the first session; they began with 15 min walking and then the duration was increased to reach 30 min; patients began with warming up for 5 minutes, followed by stimulus phase for 20 minutes and ended with cooling down for 5 minutes. The patient performed walking as a home program for 5 times. Moreover, the physiotherapy program involved strengthening exercises for the upper and lower limbs. They were performed in sitting or supine positions, twice per week. Isometric exercises provided sufficient muscle tone with no aggravation of clinical disease activity in case of acutely inflamed joints. Moderate contraction was held for 5-10 seconds, 5-20 repetitions, 3 bouts. However, in case of low disease activity, exercises should be performed using very low weights.

Outcome measures

Primary outcome (pain severity)

It was measured for each patient in both groups pre and post treatment by the visual analogue scale (VAS), a 10 cm line, with 0 cm representing absence of pain and 10 cm representing killing pain. The patient marked on the line the point, indicating his/her pain level [20].

Secondary outcome (Pulmonary function)

A spirometer was used to measure FVC and FEV1 for each patient in both groups pre and post treatment [21]. The FEV1 and FVC were measured in liters and each of them was expressed as a percentage of predicted values [22].

Statistical analysis

Results were expressed as mean $\pm$ standard deviation (SD). In normally distributed data, unpaired t test was used for comparison of different variables between groups, while paired t test was used for pair-wise comparison (pre- versus post-assessment) within the same group for different variables. Statistical Package for Social Sciences (SPSS) computer program (version 23 windows) was used for data analysis. P value $\leq$ 0.05 was considered significant and $>$ 0.01 was considered highly significant.

Results

As indicated by the independent t test, there were no statistically significant differences ($P > 0.05$) between both groups with regard to age, weight, height, body mass index (BMI), pain severity and pulmonary function (Tables 1-2).

Table 1. Demographic data of both groups

	Group A	Group B	t-value	P-value
Age (years)	6.75 $\pm$ 7.13	40.5 $\pm$ 12.04	-0.536	0.611
Body mass (Kg)	86.25 $\pm$ 16.8	81 $\pm$ 19.84	0.404	0.7
Height (m)	1.77 $\pm$ 0.067	1.61 $\pm$ 0.087	2.984	0.051
BMI (Kg/m ²)	27.7 $\pm$ 6.76	31.24 $\pm$ 6.67	-0.746	0.484

*Significant level is set at alpha level $>$ 0.05

Table 2. Descriptive statistics and multiple pairwise comparison tests (Post hoc tests) of the dependent variables for both groups

	Group A		Group B	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
FVC	3.68 ± 0.77	4 ± 0.89	3.11 ± 0.24	3.18 ± 0.41
FEV1	1.93 ± 1.07	3.29 ± 0.99	2.43 ± 0.36	2.43 ± 0.36
FEV1/FVC	0.51 ± 0.22	0.81 ± 0.14	0.77 ± 0.11	0.75 ± 0.18
VAS	88.75 ± 13.14	25 ± 017.32	70 ± 35.59	60 ± 30.27
Within groups (Pre Vs. Post)				
p-value	FVC	FEV1	FEV1/FVC	VAS
Group A	0.104	0.056	0.13	0.016*
Group B	0.567	0.85	0.653	0.201
Between groups (group A Vs. group B)				
p-value	FVC	FEV1	FEV1/FVC	VAS
Pre-treatment	0.219	0.415	0.071	0.361
Post-treatment	0.146	0.174	0.599	0.092

*Significant at the alpha level ($p > 0.05$)

The pain severity revealed a statistically significant reduction within group (A) ($P > 0.05$), while it showed a non-significant difference within group (B) ($P > 0.05$). The post-treatment comparison of both groups showed a non-significant difference between both groups ($P > 0.05$) (Table 2).

The pulmonary function parameters (FVC, FEV1, FEV1/FVC ratio) revealed non-significant differences within both groups. Also, they showed non-significant differences between both groups post-treatment ($P > 0.05$) (Table 2).

The percentage of improvement for pain was 71.8% in group (A) and 14% in group (B). The percentages of improvement for FVC, FEV1 and FEV1/FVC were 8.69%, 70.46% and 58.8% in group (A), while they were 2.25%, 0% and 2.59% in group (B).

Discussion

The current study was the second one to be conducted in Siwa oasis to evaluate the efficiency of sand therapy on pain in RA patients and the first one that evaluated the efficacy of Siwan traditional therapy on pulmonary function in RA patients. It offered special non-pharmacological therapy with no side effects, and opened a new era of research in traditional Siwan therapy.

The results of the current study showed a significant reduction in pain severity and non-significant differences in pulmonary function parameters within group A, while there were non-significant differences in pain severity and pulmonary function parameters within group B. In addition, comparing both groups post treatment showed non-significant differences in pain severity and pulmonary function parameters between groups. Moreover, Siwan traditional therapy by sand bathing, and massage with olive oil for 5 d improved pain (71.8%), FVC (8.69%), FEV1 (70.46%), FEV1/FVC (58.8%) compared to physiotherapy program (14%, 2.25%, 0% and 2.59% respectively). This

reveals that Siwan traditional therapy produced greater percentages of improvement in pain and parameters of pulmonary function than physiotherapy program.

Pain in RA patients is primarily caused by systemic inflammation, which represents a main pathway for many reasons of restrictive lung disease (e.g. sarcoidosis or idiopathic pulmonary fibrosis) [23].

A previous study, using the new criteria of the Global Initiative for COPD to define impaired lung function categories [24], demonstrated a relationship between FEV1 and levels of C-reactive protein (CRP) [25]. Thus, inflammation blockage plays a fundamental role in treating rheumatic disorders [26].

Human research indicates an association between lowered magnesium (Mg) status and elevated inflammatory and oxidative stress. The low-grade or chronic inflammation is well indicated by CRP levels [27].

One of the causes that might affect the result was the reduction of inflammation due to the presence of magnesium and other minerals in the sand. According to Allam et al [17], Siwa sand analysis represented enriching in Mg, Ca, carbon, silicon and other chemical elements. Such elements become free and available for passage through the epidermis and absorption into dermis cells, Ca in the ionic form Ca^{2+} is crucial for muscular, nervous and cardiovascular functions. Moreover, it is well-known that concurrent Ca and vitamin D therapies increase the Ca absorption capacity. So, sunlight exposure during sand therapy supplies the body with vitamin D. As a result, sand therapy is valuable for human health, musculoskeletal disorders treatment and functional disability improvement. Magnesium salts, the prevailing minerals in Dead Sea water, have positive impact on inflammatory disorders [28]. Magnesium ions particularly play an important role in the effectiveness of Dead Sea water in treating inflammatory skin diseases through inhibiting the antigen presenting capacity of Langerhans cells [29].

Allam et al., 2018 [17] found that Siwan therapy improved pain and functional disability of RA patients more than traditional physiotherapy.

On the other hand in 1966, the German chemist Bedouni Sanouni analyzed the sand near Siwa and found that it contained higher amount of radon than adjacent areas. Geological studies revealed excessive content of iron, magnesium and silica carbonates. Rheumatological patients are highly advised to have radon spa therapies (/kc-morgan/v8227f) [30]. Radon is taken up by inhalation or transcutaneous resorption, which may be enhanced by concomitant heat or carbon dioxide [31]. Tanizaki et al [32] examined the effect of 1-3 months radon therapy on the ventilatory function of bronchial asthma patients. The percentages of improvement in ventilatory function were 3.7% for %FVC and 6.5% for FEV1.

The atmospheric temperature for the period of sand bathing was 40-45°C. Sand is formed of fine grains interspersed with air. Since it is porous, it has low conductivity for heat, making it capable of releasing the heat absorbed from the sun's rays without inducing skin burning, despite its high thermal gradient [16].

Thermal baths have advantageous effect on the oxidant/antioxidant system through reducing reactive nitrogen and oxygen species. However, heat stress can adversely impact the immune system [33].

Radiometric methods were used to assess the plasma concentrations of beta-endorphin, cortisol and adrenocorticotrophic hormone (ACTH) in male patients with osteoarthritis, who received thermal mud therapy for 12 sessions. Plasma beta-endorphin showed a significant reduction after 12 days from the treatment beginning, and a non-significant reduction after 30 days following treatment completion. Also, ACTH showed a progressive reduction, which was persistent after treatment completion. Significant reduction was only found after 30 days following treatment completion. Therefore, it could be concluded that thermal therapy could diminish pain and reduce stress through decreasing inflammation [34].

Previous research reported a definite role of tumor necrosis factor (TNF)-alpha in inflammatory joint diseases pathophysiology and it could be inactivated via binding to circulating soluble TNF-alpha receptors. The effect of mud pack therapy on serum TNF-alpha was examined. The findings suggested that the thermic factor of mud therapy modulated inflammatory reaction as well as cartilage impairment via binding of circulating TNF, controlling the activation of proinflammatory cytokines producing cells [35].

Hippocrates, the father of natural medicine, believed that human is part of the Cosmos, and that only nature could maintain or treat human's diseases. Therefore, sun, water, diet, baths and detoxification were recommended by him. He thought that health is the ideal harmony state between natural forces, and considered that the therapeutic vital force should be taken into consideration by doctors [16].

Such harmony between natural forces was achieved in Siwa due to its geographical location (the level of Oasis is below the level of sea by 0-18 m), hot and dry climate in summer and absence of pollution or noise. Consequently, it induces self-

healing, improves vital force and promotes medical tourism. Since the Siwan atmospheric temperature is 40-45°C, sand consists of fine grains interspersed with air [17].

Patients having lung diseases can benefit from elevated concentrations of breathable fine dispersion natural multi-component aerosol and negative aerosols, minimal contamination, freedom from allergens and optimum temperature-humidity microclimate condition [36].

Lack of physical activity can induce visceral fat accumulation, which, in combination with comorbidities, may cause further enhancement of chronic diseases development in a vicious cycle of chronic inflammation [37].

Research has proven that behavioral alterations through diet and physical exercise could reduce levels of inflammatory markers on the long term [38]. Previously, RA patients were forbidden from exercising to avoid inflammation exacerbation [39].

During the last twenty years, research has proven the exercise values at the molecular level and, the concept that skeletal muscle is a secretory organ. The muscle secretome identification gives a new model for interpreting the way of communication between muscles and other organs, as well as the way of maintenance and development of healthy muscle tissues. Also, myokines may indirectly mediate the anti-inflammatory outcomes of exercise. Some myokines are anabolic. Additionally, they have a direct effect on abdominal adiposity prevention, which has anti-inflammatory effect. Moreover, some myokines could systemically affect the liver and mediate cross-talk between the pancreatic islets and intestine, promoting many metabolic effects of exercise. Furthermore, other myokines are important for bone and vascular health. Exercise possibly has pleiotropic valuable influences in approximately all organs and systems, and may have direct and indirect myokine-mediated anti-inflammatory effects on inflammatory rheumatic disorders [37].

The exercise effectiveness on pain evaluated by a VAS, disability evaluated by the HAQ, quality of life and joint count was statistically significant, but the magnitude of the effect was small. However, most of these outcome measures were designed for monitoring patients in pharmacological trials and may not be suitable for the evaluation of physical programs. Hence, a small improvement of the HAQ or quality of life may reflect an inability of these variables to detect the effects of an exercise program rather than a failure of aerobic exercises to improve patients' health [40].

The most critical outcomes in RA patients, including pain, function and quality of life are improved by cardiorespiratory aerobic exercises [41]. Evidence suggested that any exercise is superior to non-exercising at all [42]. However, there is no clear definition of the required parameters of exercise (type, intensity, frequency and duration) for obtaining the best results [41].

For chronic inflamed patients, each exercise bout could enhance anti-inflammatory environment, through increasing muscle-derived IL 6, inhibiting the production of TNF and stimulating the release of anti-inflammatory cytokines (IL 1ra and IL 10). Myokines, produced by skeletal muscles during exercise, promote a direct anti-inflammatory effect or indirect one through improving comorbidities. Now, physical activity is recommended as an anti-inflammatory treatment for RA patients and no longer considered as inflammation aggravator [37].

Thermotherapy physical agents are used in the management of different musculoskeletal disorders as a part of the rehabilitation program offered primarily for relieving inflammation and pain [43]. In RA, thermal agents are used mainly to decrease pain, effusion and stiffness, leading to indirect improvement of ROM, muscle force, mobility, walking ability, functional state, and physical fitness. Therefore, thermal therapy interventions are useful particularly for inflammatory poly arthritis such as RA, which could present sub-acute and chronic inflammatory symptoms depending on the disease stage (e.g. chronic stage 1 year) [44]. This pilot study was part of long term study with 30 RA patients. The non-significant differences within group (B) might be caused by the short duration of intervention. This study has some limitations. First, it was short term study.

Some patients were misdiagnosed. Finally, some variables such as, cardiac function, DLCO, inflammatory markers, muscle strength and quality of life were not assessed.

Conclusion

The percentages of improvement for pain and lung function were greater in RA patients receiving Siwan therapy than those receiving traditional physiotherapy.

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