

# Effects of conventional rehabilitative and aerobic training in patients with idiopathic inflammatory myopathy

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## Abstract

**Objective:** To investigate the efficacy of conventional rehabilitation alone and conventional rehabilitation combined with aerobic training on muscle strength and function, health condition, and quality of life for patients with stable idiopathic inflammatory myopathy (IIM).

**Methods:** This is a historical retrospective cohort study, in which the medical records of patients with IIM, who received the combination of conventional rehabilitative therapy and aerobic training (combined training group [CTG]), from February 2015 to December 2017 were reviewed. Patients with IIM who received conventional therapy alone were matched based on their age, gender, and disease activity as the control group (CG). Scores obtained on manual muscle testing of eight designated muscles (MMT8) was the primary outcome measure, and scores on the myositis Functional Index-2 (FI-2), Health Assessment Questionnaire (HAQ), and 36-item Short Form Medical Outcomes Study Questionnaire (SF-36) at 12 weeks during training were the secondary outcomes.

**Results:** Fifty-six patients (28 in the CTG and 28 in the CG) were included in this analysis. Patients in both groups had improved MMT8, FI-2, HAQ, and SF-36 scores after 12 weeks of physical therapy. The CTG had a significantly higher score on the MMT8 and HAQ than the CG in the 12th week. The FI-2 scores were significantly higher in the CTG for the four items ( $P < 0.05$ ) of hip flexion, step test, heel lift, and toe lift. SF-36 scores of the CTG were also higher than those of the CG for the five items ( $P < 0.05$ ) of physical functioning, general health, vitality, social functioning, and mental health.

**Conclusions:** Physical exercise training including conventional rehabilitation and aerobic training improved muscle function, health condition, and quality of life. Conventional rehabilitative training combined with aerobic training achieved better improvement compared with conventional rehabilitation training alone.

## Keywords

idiopathic inflammatory myopathy • rehabilitation • aerobic training

## Introduction

Idiopathic inflammatory myopathies (IIMs) are a group of chronic autoimmune diseases mainly involving the muscular tissue, especially proximal muscles in the extremities, manifested as muscle weakness and muscle atrophy in severe cases, elevated muscle enzyme levels, and degeneration

and necrosis of the involved muscle fibers revealed by muscle biopsy. A group of autoantibodies is frequently present in the serum of IIM patients, and these myositis-specific antibodies and myositis-associated antibodies may indicate different clinical patterns. The systematic inflammation in IIMs could affect vital organs, including the heart, lungs, joints, and the gastrointestinal tract.<sup>[1]</sup> Among all systemic involvements, skeletomuscular damage is one of the prominent manifestations. Due to the loss of muscle strength of extremities, especially proximal extremities, patients often experience difficulty in activities of daily living, such as raising arms, combing, dressing, and grooming; if the lower extremities are involved, patients usually present with slow ambulation, difficulty sitting

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down, standing up, and climbing up or down stairs. More than 50% of patients with IIM also experience muscle pain or tenderness.<sup>[2]</sup> Patients' muscle function and quality of life are severely impaired by the declining muscle strength and multiorgan involvement.<sup>[3]</sup> Till now, the therapeutic strategy of choice in active IIM is based on glucocorticoids in combination with immunosuppressants, including conventional synthetic disease-modifying antirheumatic drugs and biologics such as rituximab. However, pharmacological therapy may not be sufficient for patients to restore their muscle strength and capability of daily routines. Muscle atrophy and joint contracture could be further aggravated by the lack of physical exercise caused by chronic inflammation, gravely deteriorating the patient's mood and quality of life.

In addition to conventional medications, physical therapy has recently become a major means of intervention to help patients with IIM regain muscle strength and physical capacity. Accumulating evidence demonstrates that physical exercise, including resistance training, aerobic exercise, and a combination of these two programs, could help improve muscle strength, fatigue, and myalgia in patients with IIM, without increasing the risk of disease reactivation, thereby supporting the safety and efficacy of physical exercise.<sup>[3–6,7]</sup> Active or assisted joint stretch training could relieve tendon contracture, maintain or even expand the angular range of motion, and make the joints more flexible. In addition, it has been reported that aerobic exercises could significantly increase oxygen uptake in the muscles, thus improving the coordination of the muscles involved and physical functioning of patients. Meanwhile, by strengthening cardiopulmonary function and psychological relaxation, fatigue could be relieved and mood tranquilized, indicating that aerobic exercises might have prominent roles in the rehabilitation of both body and psychological function in patients with IIM.<sup>[8–10,11]</sup>

Numerous studies have demonstrated the benefits of aerobic exercises in patients with IIM; however, the sample sizes in these studies are small.<sup>[9–11]</sup> Very little information on the effects of aerobic exercises on patients with IIM in the stationary phase is available in China. The objective of this retrospective study was to investigate the efficacy of (i) conventional rehabilitative training and (ii) a combination of conventional rehabilitative training and aerobic training on muscle strength, endurance, and quality of life in patients with low disease activity of IIM.

## Patients and Methods

### *Patient Inclusion and Data Collection*

This was a single-center historical retrospective cohort study conducted at the Department of Physical Medicine and Rehabilitation and the Department of Rheumatology and

Clinical Immunology, Peking Union Medical College Hospital, Beijing, China. This cohort included patients with IIM treated at the Peking Union Medical College Hospital, based on the Chinese Rheumatism Data Center, from February 2015 to December 2017. Patients with IIM who received the combination of conventional rehabilitative training and aerobic training were included in the analysis as the combined training group (CTG), and patients who received conventional rehabilitative training alone in this single-center IIM cohort were termed the control group (CG) and matched 1:1 with the CTG based on their age, gender, and disease activity. The inclusion criteria were as follows: (1) those that met the 1975 Bohan and Peter diagnostic criteria;<sup>[12]</sup> (2) age >16 years; (3) manual muscle test (MMT) of Grade 3 or higher in all muscle groups, and frequency of physical exercise of less than once a week; (4) having been in a stationary phase for at least 1 month, with serum creatine kinase level <3 times the upper limit of normal, and oral prednisone acetate medication of <15 mg/d (or other types of glucocorticoid of equivalent doses); and (5) no changes in the pharmacological therapy during the 12 weeks of physical therapy. The exclusion criteria include the following: (1) interstitial lung disease with declined pulmonary function test or other abnormalities in cardiopulmonary function; (2) severe osteoporosis or malfunctioning of the extremities or joints; (3) injuries to the extremities that severely interfere with normal motor function; and (4) complications such as infection or malignancy. Informed consent was obtained from all participants.

## Methods

### *Conventional rehabilitative training*

Functional assessment was completed at the beginning of the first clinical encounter for all patients with IIM, in order to develop an appropriate rehabilitative training regimen for motor abnormalities in the extremities.<sup>[13]</sup> Conventional muscle strength training was provided for weaker muscle groups, weakness being defined as the inability to perform functional movements well in daily life, or muscle strength weaker than Grade 4 when measured using bare hands. For example, a strategy of 10 repetitions per set could be adopted for muscles of the torso, as well as the shoulder and hip girdles, while 10–15 repetitions per set could be applied for the shoulder, elbow, and knee joints. The total duration of training should be limited to not >40 min each time, where three sets of movements should be accomplished. The frequency was set as once or twice a day, 4 d a week. Resistance training could be applied to the muscle groups that were able to rapidly perform motor activities within the normal range of motion in the antigravity position. Joints with limited range of motion should be treated with manual stretching and joint mobilization to maintain and expand the angular range of motion, until a normal range of motion is achieved. Occupational therapy was adopted, which included functional movements

of daily living, such as postural control of the shoulder joint, as well as alternating thumb opposition and cooperative finger grasping and stretching with the wrist stabilized. Sit-ups and sitting balance exercises, stand-ups, standing balance and gait exercises, dressing, eating, grooming, and so on were included in the training of the activities of daily living. In the middle stage of the training program, the range of motion in the joints, muscle strength, and activities of daily living were assessed every week. The results of the assessment of the physical condition and motor ability served as the basis for periodical adjustments in the training regimen, making it more individualized.

### **Aerobic training**

The aerobic training program was bicycling. The equipment for aerobic training was VIA sprint 150P bicycles (manufactured by COSMED, Roma, Italy), while the equipment for cardiopulmonary exercise test (CPET) was MasterScreen CPX (manufactured by Jeager, Hesse, Germany), installed with the MasterScreen pulmonary function testing system programmed by Carefusion. In order to determine the amount of aerobic exercise, patients were instructed to complete a 5-min warm-up session and then to bicycle at 20 W. The power was increased at a rate of 5 W/min, and the revolving speed was maintained at 50–60 rev/min until exhaustion was achieved, revolving speed declined, or symptoms such as shortness of breath and chest tightness appeared. Then, the speed would be gradually lowered to zero. The highest power achieved by the patient served as the basis to design the regimen for rehabilitative training.

In the actual practice of aerobic training, the intensity was set to 50% of the maximum power in the CPET, with a duration of 30 min each time, and a frequency of three times per week in the first 4 weeks of training, and five times per week from the fifth through the 12th week. A 5-min warm-up session was completed before each training, as well as a 5-min relaxation exercise afterward. Real-time heart rate was monitored during the training, maintaining a target heart rate (THR) of < resting heart rate +40% of heart rate reserve (HRR) ( $HRR = \text{maximum heart rate} - \text{resting heart rate}$ ). When the actual heart rate markedly exceeds the THR, the speed should be lowered if necessary, or the power should be lowered to 30–40% of the maximal power in the CPET. After the heart rate is reduced to an acceptable level, the intensity can be reset to the initial level and maintained till the end of training. The environment should be quiet, with fresh air and bright lighting, and talking should be avoided for fear of interfering with the training.

### **Outcomes and assessments**

Medical records were reviewed, and four of the core set measures recommended by the International Myositis

Assessment and Clinical Studies Group (IMACS) to assess the disease activity and the injury caused by myositis, which were closely related to the effects of rehabilitative training, were adopted as outcome measurements.<sup>[14]</sup>

- (1) Measurement of muscle strength (by MMT8): Muscle strength was assessed before training, as well as at the end of 4, 8, and 12 weeks of training. MMT8 was developed based on conventional manual muscle assessment, measuring the eight major groups involved in myositis.<sup>[15]</sup> The eight muscle groups included neck flexors, deltoids, biceps, wrist extensors, gluteus maximus and medius, quadriceps, and ankle dorsiflexors. Unilateral assessment of muscle groups was usually performed on the dominant side. The test was performed in the antigravity position when possible, but otherwise performed in the gravity-eliminated position. Each muscle group was assessed according to the MMT grading, with a full score of 10 in each item, and the final score was defined as the sum of all scores, with a full final score of 80. A higher score meant stronger muscles.
- (2) The Functional Index-2 (FI-2): This scale was applied to assess the muscle endurance and the capability of persistent movement before and after the training. FI-2 is now commonly adopted in many countries to specifically monitor the extent of muscle involvement in patients with polymyositis (PM) and dermatomyositis (DM).<sup>[16]</sup> The assessment included seven motions: shoulder flexion, shoulder abduction, neck flexion, hip flexion, knee extension, heel lifts, and toe lifts. The unilateral assessment was usually performed on the dominant side. In this part, the scores in different items were not summed up but were presented separately. The minimum speed of movement was set by a metronome, and the score in each item was determined by the maximum number of repetitions in 3 min. A higher score meant better muscle function. Except for heel and toe lifting, in which a full score was 120, the full score for each motion was 60.
- (3) Health Assessment Questionnaire (HAQ): Assessment of functions of daily living was made before training, as well as at the end of 4, 8, and 12 weeks of training. In this assessment, eight sections of activities were included: dressing and grooming, arising, eating, walking, hygiene, reach, grip, and usual activities.<sup>[17]</sup> There were two to three questions in each section, and scores of “0” to “3” were assigned to each question. A score of “0” was given if no difficulty was met, while a score of “3” was given if “unable to do” was chosen. The highest score in each section was considered as the score of the entire section, and the final score was the mean value of the scores in eight sections. A lower score means a better function of daily living. If any aids or devices were required to complete the task, the score in this question would be not <2.
- (4) Medical Outcomes Study Questionnaire 36-Item Short Form-36 (SF-36): The SF-36 is commonly adopted in

many countries for the standardized measurement of quality of life, including assessments of the following eight dimensions: vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health. By comparing the results from before and after the training, the changes in quality of life before and after rehabilitation could be observed consistently and effectively. A total of 36 questions were asked in the questionnaire, and each question belonged to one of the dimensions. The score was calculated with a certain formula, and a score for each dimension was reported. A higher score meant a higher quality of life and level of well-being in the corresponding dimension.<sup>[18]</sup>

### Statistical Analysis

All the data were analyzed with SPSS 23.0. Measurement data are presented as mean  $\pm$  standard deviation (SD), where differences between groups were assessed by independent samples *t*-test, and differences before and after training were assessed by paired *t*-test. Enumeration data were analyzed by the chi-square test. A *P*-value of  $<0.05$  was designated statistically significant.

### Results

A total of 56 patients were included, whose ages ranged from 22 years to 67 years. There were 28 patients in the CTG and 28 in the CG. The CTG included 10 males and 18 females, with a mean age of  $48.22 \pm 13.63$  years. In this group, 12 patients had PM, and 16 had DM. Meanwhile, the CG included 13 males and 15 females, with a mean age of  $47.15 \pm 11.65$  years. In this group, 10 patients had PM, and 18 had DM. No significant difference was found in the demographic features

and disease classifications between the two groups ( $P > 0.05$ ). Neither was there any significant difference in serum creatine kinase (CK) levels before and after the study ( $303.89 \pm 134.4$  U/L vs.  $278.89 \pm 134.83$  U/L,  $P > 0.05$ , in the CTG; and  $264.39 \pm 132.88$  U/L vs.  $273.96 \pm 139.15$  U/L,  $P > 0.05$ , in the CG). The physical therapy was well tolerated by all patients, and there were no dropouts (Table 1).

### The Impact of Different Regimens on Muscle Strength (MMT8)

Muscle strength (MMT8) scores determined before training and at 4 weeks, 8 weeks, and 12 weeks after initiation of rehabilitative training were compared. MMT8 scores obtained at the 4th, 8th, and 12th weeks during training showed significant improvement compared with the baseline ( $P < 0.05$ ; Figure 1).

Meanwhile, the MMT8 scores of the two groups were compared at the 4th, 8th, and 12th weeks during training, revealing significantly higher scores in the CTG compared with the CG ( $P < 0.05$ ; Figure 1).

### The Impact of Different Regimens on the FI-2 scores

Both the CTG and the CG achieved significantly higher FI-2 scores in each section after 12 weeks of training, compared with the baseline ( $P < 0.05$ ). The scores in the CTG for hip flexion, knee extension, heel lifting, and toe lifting were significantly higher than in the CG ( $P < 0.05$ , Table 2).

### The Impact of Different Regimens on HAQ scores

The HAQ scores in both the CTG and the CG at the 4th, 8th, and 12th weeks after initiation of training were significantly

Table 1: Demographic baseline data for the CG ( $n = 28$ ) and the CTG ( $n = 28$ )

	CG ( $n = 28$ )	CTG ( $n = 28$ )	<i>P</i> -value
Age (years)	$47.15 \pm 11.65$	$48.22 \pm 13.63$	0.75
Sex, female/male	15/13	18/10	0.41
Diagnosis of IIM, PM/DM	10/18	12/16	0.58
Disease duration since symptom onset (months)	$22.8 \pm 4.6$	$23.1 \pm 5.2$	0.82
Serum CK (U/L)	$278.89 \pm 134.83$	$264.39 \pm 132.88$	0.69
MMT8 (range: 0–80)	$53.46 \pm 8.72$	$54.07 \pm 10.08$	0.65
Daily prednisone dose (mg)	$5.35 \pm 2.10$	$5.12 \pm 3.12$	0.75

Abbreviations: CG, control group; CK, creatine kinase; CTG, combined training group; DM, dermatomyositis; IIM, idiopathic inflammatory myopathy; MMT8, manual muscle testing of eight muscles; PM, polymyositis.

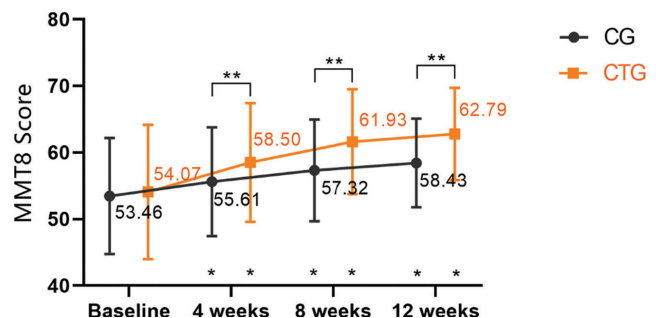


Figure 1: Mean MMT8 scores of the CTG and CG before and after training. \*Indicates  $P < 0.05$  compared with the baseline scores from the same group, respectively. \*\*Indicates  $P < 0.05$  between CTG and CG. CG, control group; CTG, combined training group; MMT8, manual muscle test.

Table 2: The FI-2 scores of the CTG and the CG before and after training ( $M \pm SD$ )

	CTG (n = 28)		CG (n = 28)	
	Baseline	12 weeks	Baseline	12 weeks
Shoulder flexion	33.21 ± 16.81	37.68 ± 15.04*	32.75 ± 14.23	36.25 ± 16.05*
Shoulder abduction	32.93 ± 14.24	40.04 ± 11.22*	36.14 ± 14.93	40.07 ± 13.39*
Neck flexion	46.46 ± 8.72	52.71 ± 5.40*	46.46 ± 8.72	51.64 ± 5.36*
Hip flexion	33.93 ± 8.44	43.57 ± 8.28*	33.21 ± 10.50	39.68 ± 4.99 <sup>Δ</sup>
Knee extension	42.18 ± 12.93	50.79 ± 5.32*	39.61 ± 11.03	45.04 ± 5.97 <sup>Δ</sup>
Heel lifts	61.11 ± 21.22	77.39 ± 14.83*	63.57 ± 21.26	67.79 ± 20.92 <sup>Δ</sup>
Toe lifts	53.11 ± 18.97	65.21 ± 17.60*	50.64 ± 14.36	59.64 ± 14.68 <sup>Δ</sup>

\*Indicates  $P < 0.05$  compared with the baseline scores of the same group.

<sup>Δ</sup>Indicates  $P < 0.05$  between the CTG and the CG.

Abbreviations: CG, control group; CTG, combined training group; FI-2, Functional Index-2.

lower than at baseline ( $P < 0.05$ ). In the CTG, the HAQ scores at 8 and 12 weeks were significantly lower than in the CG ( $P < 0.05$ ; Figure 2).

### Comparison Between the CTG and CG in Medical Outcomes Study Questionnaire SF-36 Scores Before and After Training

Both the CTG and the CG achieved significantly higher scores, compared with the baseline, in each dimension of quality of life after 12 weeks of training ( $P < 0.05$ ). In the dimensions of vitality, general health perceptions, physical role functioning, social role functioning, and mental health, the scores in the CTG were significantly higher than in the CG at the 12th week during training ( $P < 0.05$ ; Table 3).

## Discussion

In this retrospective study, the effects caused by conventional rehabilitation training alone and by conventional rehabilitative training combined with aerobic training on the muscle function and quality of life in patients with IIM in the stationary phase were compared. As shown in the Results section, patients in both the groups had improved MMT8, FI-2, HAQ, and SF-36 scores after 12 weeks of physical rehabilitation therapy, indicating better muscle function, health condition, and quality of life. In addition, the CTG had significantly higher HAQ scores than the CG at the 4th, 8th, and 12th weeks after initiation of training. Significantly higher scores in vitality, general health perceptions, physical role functioning, social role functioning, and mental health of SF-36 in the CTG were also achieved in the CTG than in the CG. The physical therapy program was well tolerated by all patients, and the unchanged CK levels before and after 12 weeks of physical therapy demonstrated stable disease activity.

Previous research has shown that endurance training and aerobic exercise can achieve improvement of muscle

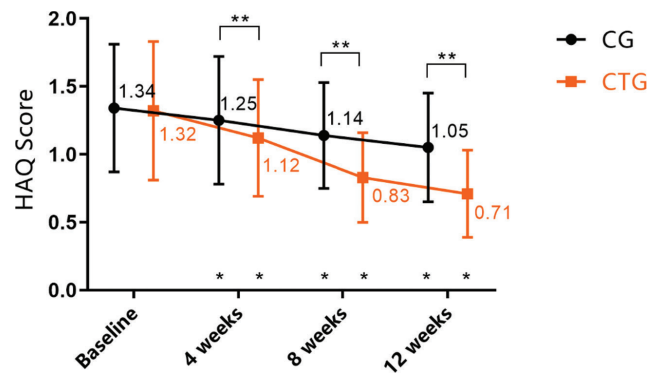


Figure 2: HAQ scores of the CTG and the CG before and after training. \*Indicates  $P < 0.05$  compared with the baseline scores from the same group. \*\*Indicates  $P < 0.05$  between CTG and CG. CG, control group; CTG, combined training group; HAQ, Health Assessment Questionnaire.

function, aerobic metabolism, and quality of life, along with decrease in disease activity.<sup>[19, 20]</sup> Further, the higher scores of general health perceptions and social role functioning indicate that the training regimen in this study could also remarkably improve the general health condition and social adaptation.

It has also been reported in a controlled study conducted in 1998 that after 6 weeks of aerobic training, including bicycling and walking, in 14 patients with IM, the maximum isotonic strength in the lower extremities, the activities of daily living, and oxygen uptake per unit body weight all improved.<sup>[21]</sup> In the present study, the MMT8 scores were significantly higher in the CTG than in the CG at the 4th, 8th, and 12th weeks during training. Additionally, CTG presented with higher FI-2 scores of hip flexion, step test, heel lift, and toe lift compared with the CG after 12 weeks of training, indicating that long-term aerobic training, regardless of intensity, could strengthen the muscles damaged by IIM. In terms of duration and endurance,

Table 3: Medical Outcomes Study Questionnaire SF-36 scores of the CTG and CG before and after training

	CTG (n = 28)		CG (n = 28)	
	Baseline	12 weeks	Baseline	12 weeks
Physical role functioning	47.50 ± 11.43	63.93 ± 7.98*	47.32 ± 13.51	57.32 ± 10.76 <sup>a</sup>
Physical functioning	41.96 ± 28.91	55.36 ± 30.70*	42.86 ± 31.07	50.00 ± 26.35*
Bodily pain	53.96 ± 29.27	68.04 ± 13.79*	54.82 ± 24.27	69.25 ± 16.75*
General health perceptions	40.46 ± 15.41	63.14 ± 11.43*	41.36 ± 14.83	55.00 ± 13.66 <sup>a</sup>
Vitality	38.39 ± 22.68	70.09 ± 9.37*	37.48 ± 22.71	62.72 ± 16.71 <sup>a</sup>
Social role functioning	49.55 ± 19.98	72.32 ± 16.79*	43.75 ± 24.88	61.58 ± 13.58 <sup>a</sup>
Emotional role functioning	45.54 ± 30.39	51.19 ± 27.84*	49.70 ± 26.69	52.62 ± 31.54*
Mental health	44.29 ± 18.40	59.46 ± 18.33*	42.50 ± 16.13	52.14 ± 15.00 <sup>a</sup>

\*Indicates  $P < 0.05$  compared with the baseline scores of the same group.

<sup>a</sup>Indicates  $P < 0.05$  between the CTG and CG.

Abbreviations: CG, control group; CTG, combined training group; SF-36, short form 36.

the combination of aerobic training and conventional rehabilitative training was superior to conventional rehabilitative training alone. Since the aerobic exercise used in this study is bicycling, the significant improvement in the function of the muscles of the lower extremity was reasonable.

There are well-established regimens and procedures of conventional rehabilitative training to regain motor ability, improve cardiopulmonary function, and modify sport psychology. However, the problems caused by IIM often include, in particular, weakness in the core muscles of the torso and muscle groups of the proximal joints, such as weakness of shoulder flexors and abductors, hip flexors, extensors, abductors, and adductors, and so on, which are critical muscle groups in daily activities. Such damage causes considerable impairment in the activities of daily living, which, nevertheless, was found to be directly improved by the training in our study.

In this study, the hypothesized mechanisms by which the stress in life was relieved and quality of life improved after the training are as follows: (1) long-term progressive training could decrease the arterial blood pressure, the activity of the sympathetic nervous system, and the resting heart rate, while prolonging the diastole of cardiac muscles and increasing their perfusion, generally improving physical functioning and physical and mental well-being; (2) aerobic exercises could increase the maximum oxygen uptake of the cardiac muscles, which is a good indicator of endurance. Better endurance means longer duration, more experience, and better skills, making the movements better coordinated and easier to accomplish; (3) aerobic exercises are relatively simple, and the intensity can be acceptable, which builds up confidence for the patients and relieves frustration, leading to very obvious improvements in their quality of life.

This study had several limitations. First, conventional

rehabilitative training programs varied in different patients according to their condition and were difficult to quantify. It might thus cause bias. Second, this study lacked a group with no physical therapy as a blank group; thus, a possible influence of the natural course of the disease and the effects of pharmacological therapy cannot be ruled out. Third, the sample size was limited because IIM is a rare disease. Finally, the “placebo intervention” was difficult to design, and the placebo effect of aerobic training could also not be ruled out.

Currently, practitioners in many countries have made very meaningful attempts to develop a rehabilitative regimen for patients with inflammatory myopathies, although more in-depth studies are still needed to accurately calculate the amount of training needed and to correctly judge the feedback signal of the body. In addition to the loss of motor ability, IIM patients particularly experience impaired endurance and aerobic metabolism after the onset of disease, manifested as marked shortness of breath and dizziness after minimal physical exercises. Based on the reported study, this study tried to specifically adjust the regimens to the habits and physical abilities of our participants, trying to make it possible for the patients to practice these exercises in their daily lives.

To our knowledge, this is the first study to explore the effect of physical therapy on patients with IIM in China. This study demonstrates that in addition to rehabilitative training in the stationary phase, systematic aerobic training regimens could help patients with IIM improve their muscle strength, endurance, quality of life, physical functioning, the functions of daily life, and so on, further achieving the goal of rehabilitation, which is their rejoining in the society. By developing a new rehabilitative regimen, with the hope of future modifications, this study could assist patients with IIM to cope with the negative impacts of IIM on their lives caused by impaired motor functions and to improve their quality of life.

## Conflict of Interest

Xiaofeng Zeng is the Editor-in-Chief of the journal; Mengtao Li is an Associate Editor-in-Chief; and Jiuliang Zhao and Qian Wang are Editorial Board Members of the journal. The article was subject to the journal's standard procedures, with peer review handled independently of these members.

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