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ORIGINAL

FEASIBILITY ANALYSIS OF COMBINED TRADITIONAL CHINESE MEDICINE FUMIGATION AND ELECTROMYOGRAPHY BIOFEEDBACK IN FOOTBALL PLAYERS WITH SHOULDER-HAND SYNDROME AFTER STROKE

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ABSTRACT

Objective: Exploring the feasibility of combining herbal fumigation and myoelectric biofeedback therapy in football players with post-stroke shoulder-hand syndrome. **Methods:** A total of 80 football players with shoulder-hand syndrome after stroke who were healed in our hospital from July 2019 to June 2021 were retrospectively opted as the research subjects, and were divided into a joint intervention cluster (JIG) according to the variations in their healing methods. cluster, n=40, receiving traditional Chinese medicine fumigation and EMG biofeedback healing) and EMG healing cluster (Electromyobiological feedback cluster, EFG cluster, n=40), the healing effect, changes in simplified FMA mark of upper limbs before and after healing, and healing effects were contrasted between the two clusters. The changes of the front and rear shoulder pain and the pain part of the High Coast Shoulder Joint Function Rating Scale were recorded, and the occurrence of adverse reactions in the two clusters of football players was recorded; **Results:** The total effective rate of football players in the JIG cluster was 97.50% (39/40), which was notably upper than 85.00% (34/40) in the EFG cluster, and the variation between the clusters was notable (P<0.05). None notable variation in the simplified FMA mark between the clusters (P>0.05). On the 7th, 14th, and 28th days of healing, the simplified

FMA mark of the upper limbs of the JIG cluster was notably upper than that of the EFG cluster, and the variation was notable (P>0.05). P<0.05); before healing, None notable variation between the two clusters in the degree of shoulder pain and the pain part of the Gaoshore Shoulder Joint Function Assessment Scale (P>0.05). After 28 days of healing, the degree of shoulder pain in the JIG cluster was notably bottom In the EFG cluster, the pain mark of the Gaoan Shoulder Joint Function Assessment Scale was notably upper than that in the EFG cluster, and the variation between the two clusters was notable (P<0.05); None notable variation in the incidence of adverse reactions between the two clusters (P >0.05); **Conclusion:** Combination of traditional Chinese medicine fumigation and EMG biofeedback for football players with shoulder-hand syndrome after stroke has a good effect, which can notably relieve the pain symptoms of football players, enhance their joint mobility, and at the same time, the healing is safe.

KEYWORDS: Stroke; Shoulder-hand syndrome; Herbal fumigation; Myoelectric biofeedback; Therapeutic effect

Stroke is a relatively common disease in clinical practice. Especially in recent years, with the emergence of the aging trend of society and the changes in residents' living and eating habits, the incidence of stroke has increased notably (Dickerson et al., 2012). Shoulder-hand syndrome, also known as reflex sympathetic dystrophy syndrome, is the most common complication in post-stroke hemiplegia football players, and its etiology and pathogenesis are still unclear. The disease can be induced by various factors, such as minor peripheral nerve injury or central nerve injury, or endocrine disease, myocardial infarction, etc. (Zhang et al., 2016). The typical clinical manifestations of football players with shoulder-hand syndrome are pain in the upper limb on the affected side, skin discoloration, increased skin temperature, nutritional disorder, edema, and limitation of upper limb mobility, etc., mostly within 1-3 months after stroke (Haring et al., 2015).

Timely and effective healing is of great significance to enhance the prognosis of football players with shoulder-hand syndrome. If no effective healing is available, some patients may have permanent deformities of the shoulders and fingers, which will seriously affect the quality of life of football players. EMG biofeedback therapy is a common intervention measure for stroke, which has positive significance in enhancing muscle strength and improving muscle tension in stroke football players (Larsson, Virtamo, & Wolk, 2012). Traditional Chinese medicine fumigation is a traditional medical healing method in the motherland. It has a wide range of applications in diseases, etc. (Ozawa et al., 2017). This study intends to analyze and discuss the application value of traditional Chinese medicine fumigation and EMG biofeedback therapy

in football players with shoulder-hand syndrome after stroke by setting up a control cluster, in order to provide a reference for improving the prognosis of such patients.

1. MATERIALS AND METHODS

1.1 General data

A total of 80 football players with shoulder-hand syndrome after stroke who were healed in our hospital from July 2019 to June 2021 were retrospectively opted as the research subjects, and were divided into a joint intervention cluster (JIG) according to the variations in their healing methods. cluster, n=40, received traditional Chinese medicine fumigation and EMG biofeedback healing) and EMG healing cluster (Electromyobiological feedback cluster, EFG cluster, n=40).

Inclusion criteria: (1) Meet the diagnostic criteria for stroke formulated by the Fourth Academic Conference on Cerebrovascular Diseases of the Chinese Medical Association (Su, Ng, Yang, & Lin, 2014), and meet the diagnostic criteria for shoulder-hand syndrome; (2) The first onset; (3) The medical records are complete and complete.

Exclusion criteria: (1) patients with psychiatric disorders; (2) patients with severe organic diseases; (3) patients with liver and kidney dysfunction; (4) included in other unresolved clinical investigations.

1.2 Intervention methods

The football players in the EFG cluster received EMG biofeedback therapy. The patients were in a supine or sitting position, and the electrode pads were placed on the abdomen of the deltoid muscle, triceps brachii, and forearm extensor muscle cluster of the patient. 80% of the EMG value is set as the threshold value of EMG biofeedback healing. During healing, the patient is instructed to perform shoulder abduction, elbow extension, finger extension, wrist extension and other exercises simultaneously. After the EMG system feedback, the patient will be given according to the set threshold 1 time of electrical stimulation, each stimulation lasted 9s, 15s interval for re-stimulation, each healing time 10min, 2 times a day, 5d a week, continuous healing for 4 weeks.

The football players in the JIG cluster were healed with traditional Chinese medicine fumigation on the basis of the football players in the EFG cluster. (15g of incense, 10g of saffbottom, 10g of Schisandra, 10g of Shenshencao) after decoction, add it to the traditional Chinese medicine fumigation healing apparatus, and align the healing nozzle at the diseased part

of the patient (the temperature is preferably 40-50 ℃) for fumigation healing, each time The fumigation time was 30 minutes, once a day, 5 days a week, for 4 weeks.

1.3 Observation indicators and evaluation standards

(1) Therapeutic effect. After healing, the patient's joint edema and pain disappeared, and none obvious limitation of movement function as markedly effective, and the joint edema basically disappeared, the pain was basically relieved, and the joint range of motion was relieved. The enhancement was ineffective, and the markedly effective rate = (markedly effective + effective)/total number of situations × 100%; (2) Simplified Fugl-Meyer mark (FMA) was used to compare the two clusters of football players before healing, 7d, 14d and 28d of healing. The shoulder joint activity was evaluated; (3) Visual analogue scale (VAS) and Gaoshore shoulder joint function assessment scale were used to evaluate the pain assessment part of the two clusters of patients before and after healing; (4) The two clusters of football players were inquired about fever, The incidence of adverse reactions such as swelling.

1.4 Statistical methods

SPSS 24.0 software was used for statistical analysis, t-test was used for the Contrastion of measurement data that obeyed normal distribution and homogeneity of variance, and was described by (mean ± standard deviation), and non-parametric data was used for skewed data or measurement data with unequal variance. The Mann-Whitney test (U test) in the test was described by the median (upper and bottom quartiles), and the measurement data was contrasted by the chi-square test, which was expressed as a situation (%), and $P<0.05$ was considered notable. significance.

2. RESULTS

2.1 Contrastion of general data of the two clusters of football players

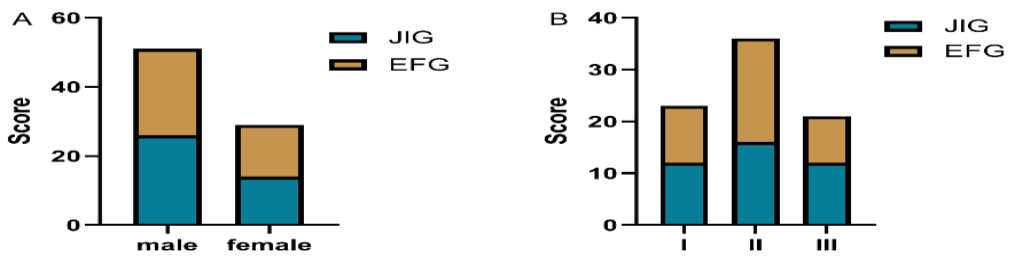

Figure 1. Contrastion of the general data of the two clusters of patients None notable variation in gender and disease stage between the two clusters (P>0.05).

The general data of the two clusters of football players, such as gender, age, course of disease, and staging of shoulder-hand syndrome, were included, and the variations between the two clusters were contrasted, Table 1 and Figure 1.

Table 1. Contrastion of general data of the two clusters of football players ($\overline{x} \pm s$)/[n (%)]

General clinical information		JIG cluster（n=40）	EFG cluster（n=40）	t/χ^2	P
Gender	Male	26	25	0.054	0.816
	Female	14	15		
Average age (years)		54.52±10.91	52.16±8.68	1.071	0.287
Average duration of illness (days)		35.40±3.85	36.09±3.61	0.827	0.411
Disease Staging	Phase I	12	11	0.562	0.441
	Phase II	16	20		
	Phase III	12	9		

2.2 Contrastion of healing effects between the two clusters of football players

There were 19 situations of markedly effective healing and 20 situations of effective healing in the JIG cluster, with a total effective rate of 97.50% (39/40), which was notably upper than that of the EFG cluster of 85.00% (34/40), and the variation between the clusters was notable (P <0.05), Table 2 and Figure 2.

Table 2. Contrastion of healing effects between two clusters of patients [n (%)]

Clusters	Cases	Visible effect	Effective	Invalid	Efficient
JIG cluster	40	19（47.50）	20（50.00）	1（2.50）	39（97.50）
EFG cluster	40	10（25.00）	24（60.00）	6（15.00）	34（85.00）
χ^2	-	-	-	-	3.914
P	-	-	-	-	0.048

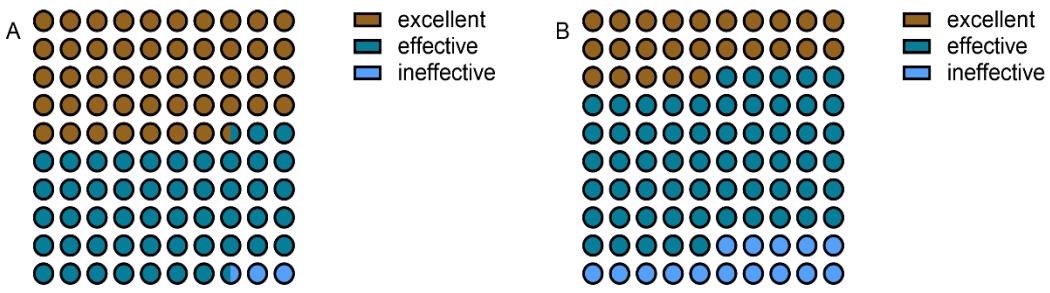

Figure 2. Contrastion of therapeutic effects between the two clusters The total effective rate

of patients in the JIG cluster was 97.50% (39/40), which was notably upper than 85.00% (34/40) in the EFG cluster, and the variation between the clusters was notable (P<0.05).

2.3 Changes in the simplified FMA mark of the upper limbs before and after healing in the two clusters of football players

Before healing, None notable variation in the simplified FMA mark of upper extremity between the two clusters (P>0.05). On the 7th, 14th, and 28th days of healing, the simplified FMA mark of the upper extremity in the JIG cluster was notably upper than that in the EFG cluster. The variation was notable (P<0.05), Table 3 and Figure 3.

Table 3. Changes in the simplified FMA mark of the upper limbs before and after healing in the two clusters of football players ($\overline{x} \pm s$)

Clusters	Cases	Page 0d	Page 7d	Page 14d	Page 28d
JIG cluster	40	13.79±1.91	25.49±4.25	32.37±4.55	36.24±4.19
EFG cluster	40	14.49±3.51	21.51±3.19	29.41±2.50	31.15±3.71
t	-	1.108	4.737	3.606	5.741
P	-	0.271	<0.001	0.001	<0.001

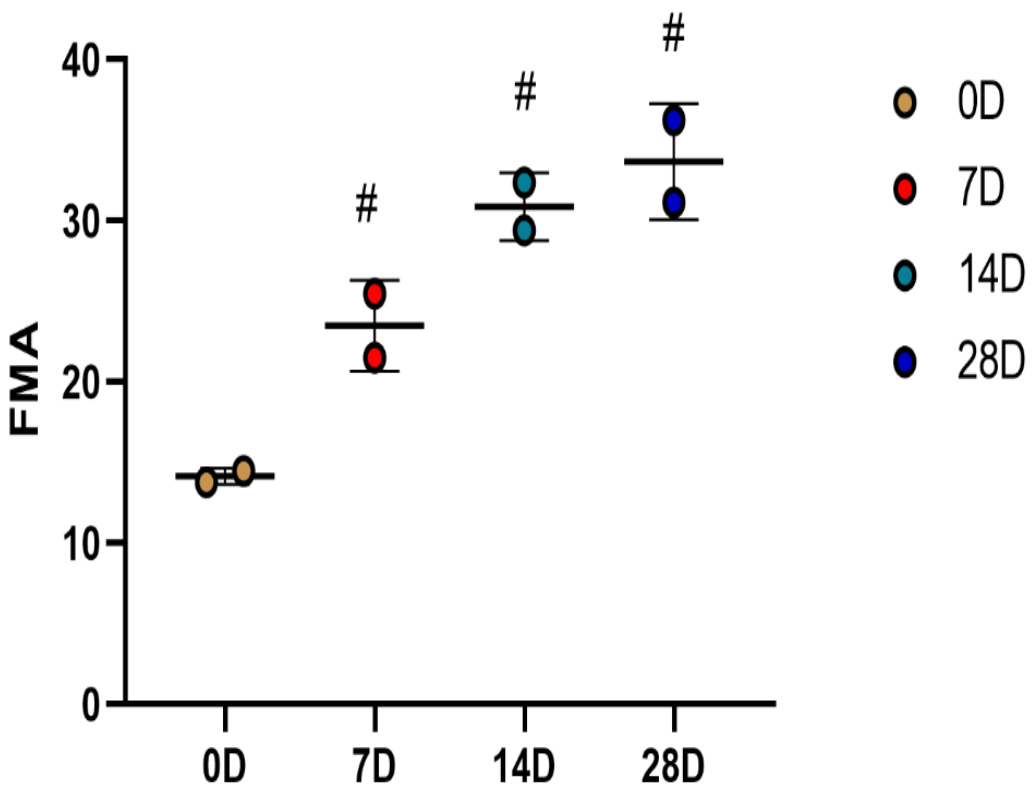

Figure 3. Changes in the simplified FMA mark of the upper extremity of the two clusters of

football players before and after healing None notable variation in the simplified FMA mark of the upper extremity between the two clusters before healing (P>0.05). The simplified FMA mark was notably upper than that of the EFG cluster, and the variation between the clusters was notable (P<0.05). # indicates that the variation between the same index clusters is notable.

2.4 Contrastion of shoulder pain and pain mark of the Gaoan Shoulder Joint Function Rating Scale before and after healing in the two clusters of patients

Before healing, None notable variation between the two clusters in the degree of shoulder pain and the pain mark of the Gao'an Shoulder Joint Function Assessment Scale (P>0.05). The pain mark of the shoulder joint function rating scale was notably upper than that of the EFG cluster, and the variation between the clusters was notable (P<0.05), Table 4, Figure 4, and Figure 5.

Table 4. Contrastion of shoulder pain and pain mark of the Gaoan Shoulder Joint Function Rating Scale before and after healing between the two clusters ($\overline{x} \pm s$)

Clusters	Cases	Pain in the shoulder		High Shore Shoulder Function Scale Pain mark	
		Before healing	After healing	Before healing	After healing
JIG cluster	40	7.75±0.99	3.15±1.03	8.07±0.89	23.11±3.34
EFG cluster	40	8.13±0.98	3.99±1.03	7.80±1.06	16.29±2.86
t	-	1.725	3.647	1.234	9.809
P	-	0.088	<0.001	0.221	<0.001

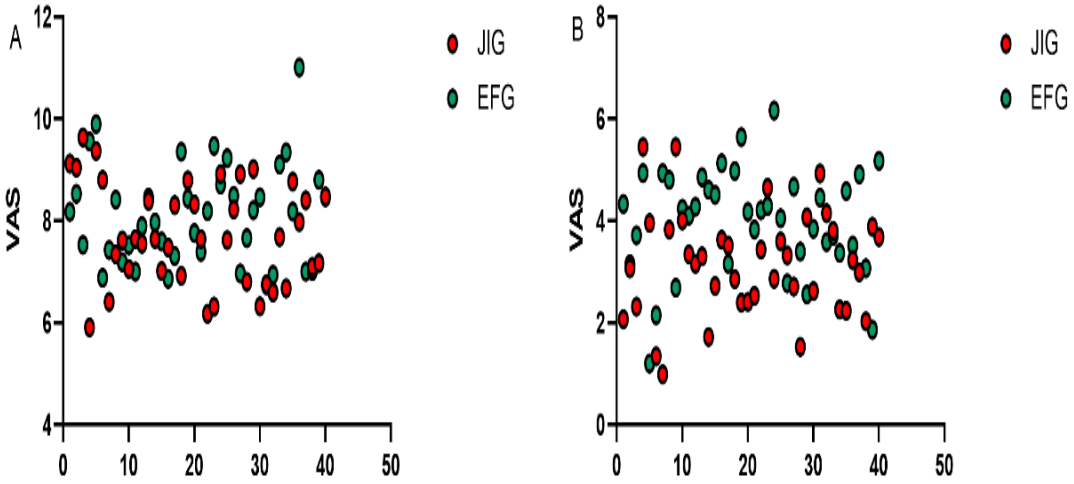

Figure 4. Contrastion of shoulder pain in the two clusters before and after healing None notable variation in the degree of shoulder pain between the two clusters before and after healing (P>0.05). After 28 days of healing, the degree of shoulder pain in the JIG cluster was notably bottom than that in the EFG cluster (P <0.05).

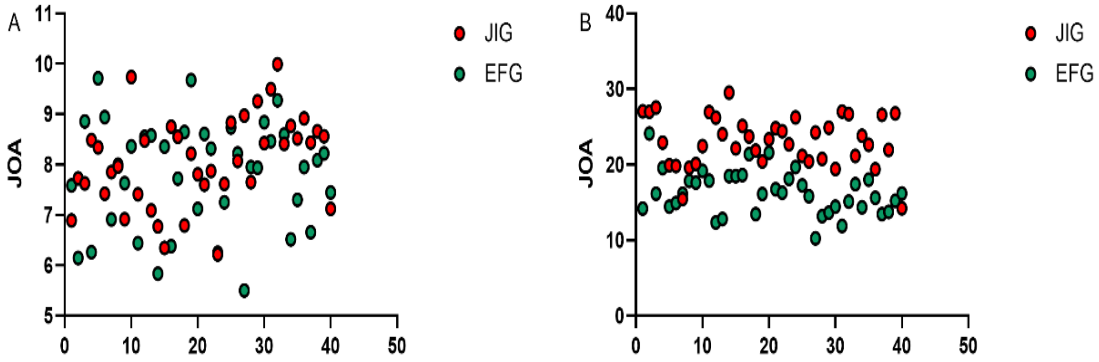

Figure 5. Contrastion of the pain mark of the Gao'an Shoulder Joint Function Assessment Scale before and after healing between the two clusters of patients before and after healing None notable variation in the pain mark of the Gao'an Shoulder Joint Function Assessment Scale between the two clusters (P>0.05). After 28 days of healing, JIG The pain mark of the Gaoan Shoulder Joint Function Assessment Scale in the cluster was notably upper than that in the EFG cluster (P<0.05).

2.5 Contrastion of the incidence of adverse reactions between the two clusters of football players

The incidence of adverse reactions in the two clusters was recorded. There were 2 situations of mild fever and 1 situation of swelling at the fumigation site in the JIG cluster, with a total incidence of 7.50%, which was not notably distinct from 5.00% in the EFG cluster (P>0.05) Table 5 and Figure 6.

Table 5. Contrastion of the incidence of adverse reactions between the two clusters [n (%)]

Clusters	Cases	Mild fever	Swelling	Total incidence
JIG cluster	40	2（5.00）	1（2.50）	3（7.50）
EFG cluster	40	1（2.50）	1（2.50）	2（5.00）
χ^2	-	-	-	0.213
P	-	-	-	0.644

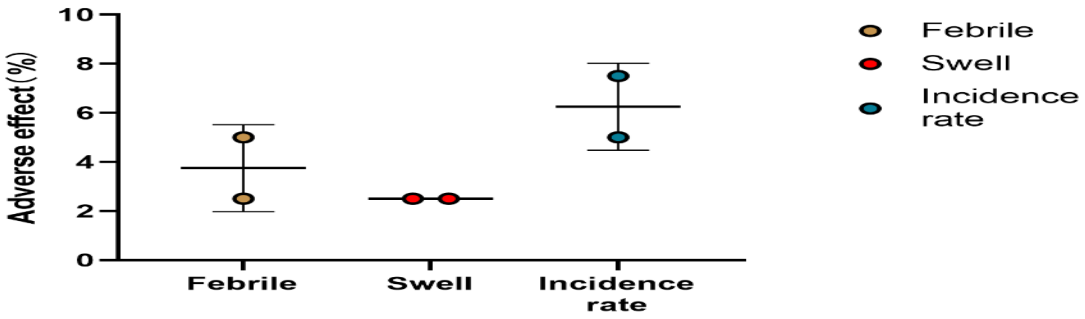

Figure 6. Contrastion of the incidence of adverse reactions between the two clusters None

notable variation in the incidence of adverse reactions between the JIG cluster and the EFG cluster (P>0.05).

3. DISCUSSION

Shoulder-hand syndrome is the most common complication in football players with post-stroke hemiplegia, which belongs to the progressive shoulder joint dysfunction after stroke. Studies have pointed out that shoulder-hand syndrome is one of the main causes of disability in stroke patients. The disease affects one limb of the patient, and may also affect the patient's two limbs or other parts of the body. Only about 20% of patients can Complete recovery (Appleby et al., 2019; Sims & Yew, 2017). Other studies have confirmed that the development of shoulder-hand syndrome to the later stage can lead to muscle atrophy on the affected side of the patient, and even spasticity symptoms. At present, shoulder-hand syndrome has become the third largest complication of stroke sequelae after falls and mental confusion (Maida, Norrito, Daidone, Tuttolomondo, & Pinto, 2020).

The control cluster was established to analyze the therapeutic effect of traditional Chinese medicine fumigation combined with EMG biofeedback therapy on football players with post-stroke shoulder-hand syndrome. The patients in the JIG cluster combined with traditional Chinese medicine fumigation were notably superior in the healing effect (97.50% vs 85.00%). A controlled study of 60 patients with post-stroke shoulder-hand syndrome found that the addition of traditional Chinese medicine fumigation could increase the healing efficiency from 67.86% to 96.55% (Koh & Park, 2017). A prospective study of football players with stage 1 disease found that adding traditional Chinese medicine fumigation on the basis of rehabilitation training can increase the therapeutic efficiency from 73.33% to 90.00% (Pérez-de la Cruz, 2020), which are similar to the results of this study.

The author of this paper analyzes that the rehabilitation training of stroke patients is actually a process of motor re-learning, which not only requires the brain to send out instructions and nerve fibers to receive instructions, but also requires the muscle system to respond to instructions, while electromyography biofeedback The healing is to make the patient re-establish the corresponding conditioned reflex through training, so that the patient can master the control of the muscle and joint movement by the nerve center. Electrical biofeedback has a certain effect on improving shoulder-hand syndrome in stroke patients (Fernández-de-Las-Peñas et al., 2021). Traditional Chinese medicine fumigation belongs to the traditional healing measures of the motherland. Traditional Chinese medicine of shoulder-hand syndrome classifies it as arthralgia. Shoulder or wrist pain should be healed by dredging the meridians and invigorating

Qi and promoting blood circulation (Zhu et al., 2021). The Duhuo JIG decoction applied by the JIG cluster in this paper contains a variety of drugs to dispel wind and relieve the exterior, promote blood circulation and remove blood stasis, stretch muscles and activate collaterals. It can promote the enhancement of limb blood circulation, accelerate metabolism, inhibit inflammatory response, enhance local pain, and lay a good foundation for subsequent recovery of limb function (Abbas, Sayed, Samir, & Abeed, 2021; ARUNACHALAM, CHINNARAJA, & MAYDEN, 2016; Xavier et al., 2020).

In this paper, by comparing the simplified FMA mark of the upper limbs, the degree of shoulder pain and the mark of the pain part of the Gaoshore Shoulder Joint Function (Anstey et al., 2021). Assessment Scale after healing in the two clusters of football players, it was confirmed that the combined healing can enhance the pain degree and local joint function of patients with shoulder-hand syndrome (Appleby et al., 2019). A comparative study by some scholars pointed out that adding traditional Chinese medicine fumigation to patients with post-stroke spastic hemiplegia can enhance the functional mark of the hemiplegic limbs and the self-care ability of the patients (Cassidy & Cramer, 2017; Hastrup et al., 2018). The author of this paper analyzes that the main purpose of EMG biofeedback is to strengthen the patient's awareness of active training, reduce the post-stroke myotonia, enhance the patient's muscle tension, and coordinate the activities of their muscles and joints (Chavez et al., 2017). At the same time, from both physical and therapeutic aspects, the blood circulation of the lesion site is accelerated, and the recovery of limb function is accelerated. The two can form a synergistic effect to maximize the therapeutic effect (Braga et al., 2020; Jiang et al., 2020). The contrastion of adverse reactions between the two clusters at the end of the article confirms the safety of the combined reaction.

4. CONCLUSION

To sum up, the combination of traditional Chinese medicine fumigation and EMG biofeedback in football players with shoulder-hand syndrome after stroke has a good effect, which can notably relieve the pain symptoms of patients, enhance their joint mobility, and at the same time, the healing is safe.

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