

Drug use to resistance exercise-induced fatigue based on diclofenac diethylamine emulgel efficacy analysis

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Abstract: In this paper, the author study on the effect of drug treatment on sports injury, and makes a comparative analysis of drug effects. In sports, the incidence of various types of injuries is increasing, especially in muscle injury. In the experiment, we compared the effects of three different drugs on the treatment and relief of muscle loss. After 3 weeks, the average optical density of desmin in muscle fiber positive region have decreased, as xiaotong plaster (0.4708 ± 0.0126), votalin (0.5124 ± 0.0264) and placebo (0.3856 ± 0.0312). It has a certain effect to promote the repair and regeneration of desmin expression by drugs. Through the analysis of the effect of drug intervention on sports injury repair, we can effectively improve the therapeutic effect of sports injury.

Keywords: Diclofenac diethylamine emulgel, surgical treatment, exercise fatigue, chronic injury.

INTRODUCTION

In the field of sports and military training, skeletal muscle injury is a common sports injury, the incidence rate of 10%~55%. In sports, athletes with various breakthrough the limit of human in the fierce competitive sports, refresh a world record, the incidence of various injury rate continues to rise, whether it is the daily training, or high strength match, the total incidence of muscle, ligament injury rate was 62.2%. The incidence of sports injuries accounted for the first (Jarvinen *et al.*, 2007; Cahill *et al.*, 2015). In addition, in recent years, the mass sports development, prompting more people join the sport, but due to the lack of professional sports guidance, the probability of sports in mass sports injury is also at a high level, and the injury of muscle and ligament injury is the most common (Dindo *et al.*, 2004; Chen *et al.*, 2009). Hematoma and muscle tissue after sports injury caused by the movement of life, athletes sports ability constitutes a potential threat, and the daily life of sports enthusiasts brought a lot of inconvenience, may even affect the enthusiasm of sports fans, so the study of exercise-induced muscle damage and regeneration of an important issue study on sports medicine is still present (Ghoneum *et al.*, 2015).

Sports injury is the main influence factors of sport life span, and chronic injury of muscle is all kinds of athletes are difficult to avoid, because both sports most athletes, basically have to do a lot of running and jumping exercises, exercise the strength of lower limbs, the chronic exercise-induced muscle injury in athletes item group is not very prominent more generally. Sports exercise, jumping and running proportion is large, but not the correct exercise habits are more likely to cause chronic injury of muscle, that reduces the sports enthusiasts sports interest and enthusiasm.

Qi Zheng Xiaotong paste is a unique effect and contains a Tibetan medicine connotation of a wet paste patch type plaster. Xiaotong paste with the Qinghai-Tibet Plateau unique natural wild herbs, the use of modern science and technology developed (Hu, 2013). Using powdered pharmaceuticals, wetting through the wetting agent after the affected area paste (Li *et al.*, 2014). Through the clinical use of drugs, the drug for acute and chronic contusion, frozen shoulder, lumbar disc herniation, lumbar muscle strain, cervical spondylosis, fracture, bone hyperplasia, rheumatoid rheumatoid pain has a very good effect, and a large number of literature, But also a lot of scholars have carried out this aspect of animal experimental research, the clinical use of this drug made a lot of contribution (Mellotte *et al.*, 2015; Liu *et al.*, 2016). But for this drug for exercise-induced chronic muscle damage research, has not yet been found, and there is no such reports. So for now, on the Xiaotong paste for the treatment of exercise-induced chronic muscle injury research is still a blank area.

MATERIALS AND METHODS

In this study, we investigated the model of exercise-induced chronic skeletal muscle injury after high-intensity running in animal experiments, and explored the expression pattern of terminal protein during the injury process (Altorki *et al.*, 2016). This rule can be used as a cycle of exercise training and prevention of sports injury And the longitudinal comparison between the drug intervention group and the training control group. To provide the basis for clinical application, better for athletes and sports enthusiasts to treat such diseases, reduce the movement of chronic muscle injury for professional athletes athletic ability and sports life of the impact, as well as shorten the sports enthusiasts of the motor injury recovery period.

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Oddness is a kind of orthopedic, surgical commonly used external application paste, the drug is based on the traditional Tibetan medicine formula developed, and out of the domestic first wet patch type patch (Tsiaras *et al.*, 2016). It is mainly used for acute and chronic soft tissue twist contusion, muscle bruises, rheumatism, lumbar muscle strain, frozen shoulder, stiff neck, etc., which are mainly used for acute and chronic soft tissue twisting. In addition to its bone hyperplasia has a good effect (Pu, 2015). Clinical use found to have easy to carry, easy storage, the exact effect, quick and so on. The main ingredients are unique flavor, water cypress, curd summer, buffalo horn, turmeric, pepper and other Chinese herbal medicine (Shi, 2010). The main drug ingredients are unique flavor, is a perennial herb, its main growth in the 3000~4500 meters of growth in the mountains, floods, etc., in the Tibetan, Gan, cloud, Sichuan generation is relatively more. Its roots and rhizome or whole medicine, herbs dry yellow surface, a stench. Unique taste is possession, Mongolia and other national folk herbs. Its pharmacological effects are: analgesic, bleeding, increase immune function, antibacterial effect. The unique taste of modern medicine in clinical mainly for surgical pain, treatment of gynecological bleeding, treatment of bone cysts, postoperative analgesia, enema treatment of ulcerative colitis. Rhododendron is a leguminous leguminous plant, the correct name of the song hair, alpine yin and other places long, the essence of taste and performance, leaf red branches and blue, flowers, red and thick color, Fruit ripe when the main role of greasy: convenience, detoxification, swelling, bleeding and so on (Xuan, 2015). Clinical studies have found that it can be used to treat anthrax, leprosy, influenza and tonsillitis and other diseases (Lu, 2014; Qi *et al.*, 2015). As a orthopedic, surgical commonly used external application paste, although its pain after the injury, blood circulation, swelling, siltation and other face-to-face clinical efficacy is more prominent, and more common in acute injury. However, the effect of surgical treatment on chronic skeletal muscle injury is not obvious, and its exercise-induced chronic skeletal muscle injury in the expression of terminal protein is also a blank area.

The experimental program was approved by the experimental animal ethics committee, which was in accordance with the relevant regulations of animal protection and national animal welfare ethics. The experimental animals were reared in the animal laboratory of the Institute, and were fed by a single cage with 1 cages per cage. The cage is made of stainless steel, with plastic water supply pipe and stainless steel water suction device. The laboratory temperature is $20 \pm 2^\circ\text{C}$, relative humidity 55%-58%. Light illumination with natural, In strict accordance with the national standard of feeding rabbits, animals using open drinking water, Standard rabbit feed by free drinking water, Feed two times a day, daily cleaning of animal room. The experimental animal for adult male rabbits 200, experimental animal grouping

scheme: according to the need of experiment, were randomly divided into two groups as control group, drug intervention group (table 1). The control group was divided into two groups according to the time of animal movement 2 weeks training control group (n=10), 3 weeks training control group (n=15), 4 weeks training control group (n=15), 5 weeks training control group (n=15). The drug intervention group was divided into two groups, which were divided into 9 groups for drug intervention:

Research method

According to the domestic research on muscle training program design documents related to chronic injury animal model, and pre experiment, the scheme analysis of problems, and actively adjust, and ultimately determine the modeling program of this experiment. The animal model of high voltage and low current electric stimulation was used to stimulate the adult male New Zealand rabbits, and to make them run passively. Every 12 seconds discharge time, discharge stimulation time for 0.1-0.2 seconds, each animal training every day for 3 times, each training for 20 minutes, every time between the rest of the training time is 20 minutes, weekly training for 5 days. The blank control group without any intervention of the animal, without any treatment, training in the control group without drug intervention, simple training; drug intervention group in each animal after training of Medicine on the left hind leg, for the first time with the animal to the end of tibia between the hair with inguinal pet push clean cut every day, after the end of the training, for medicine on the left gastrocnemius, and wrapped with gauze plaster.

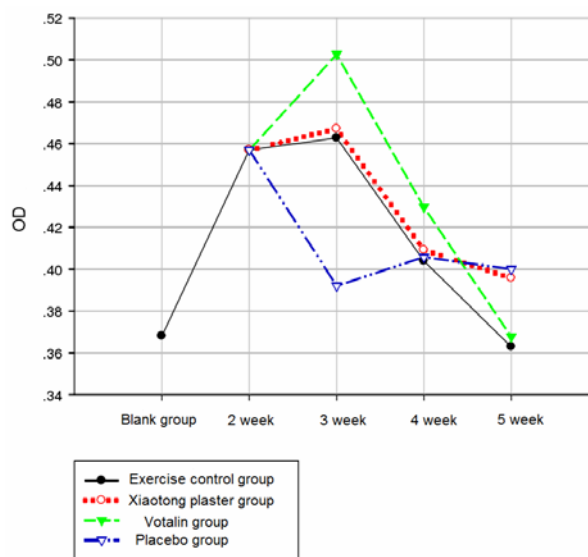


Fig. 1: Drug intervention with time

The blank control group before the start of the experiment, the animal just purchased back when the material. The rest of the control group and the experimental group according to the length of training in

each group, after the end of the training week after the second day of the material. Find the knee joint gap, with the scalpel along the knee joint skin circumcision, exposing the gastrocnemius muscle, along the gastrocnemius muscle texture to take the inside of about 15mm×10mm×10mm size of the rectangular parietal muscle tissue, be kept in 4% paraformaldehyde fixative. And then use the two-dimensional motion image measurement and analysis system MIAS4.0 on the pictures taken by grayscale scanning analysis to obtain the average optical density value. The measurement parameters were the average optical density (OD) of the nodal protein in the positive area of the muscle fibers in each field of view.

RESULTS

Blank group and control group

Compared with the control group, 2 week training group was increased very significantly than the blank group ($P < 0.001$), 3 week training group was also increased very significantly than the blank group ($P < 0.001$), but the 4 week training group and training group 5 weeks OD with blank group had no significant difference; and the 2 week training group, there is no significant difference between the 3 week training group OD, 4 week training group was decreased significantly difference ($P < 0.05$), OD 5 week training group decreased very significant difference ($P < 0.001$); and 3 weeks of training group, training group, training 4 weeks 5 week group the OD value decreased very significantly, respectively, $P < 0.01$, $P < 0.001$; and 4 weeks of training group, training for 5 weeks group was decreased significantly ($P < 0.05$) (table 2).

Time varying drug effects

In Xiaotong group, with 3 weeks of training treated group, training treated 4 weeks group and 5 weeks training treated group OD value decreased very significantly, respectively as $P < 0.01$, $P < 0.001$ and 4 weeks training treated group, there was no significant difference in training treated group 5 weeks OD. In Votalin group, with 3 weeks of training treated group, training treated 4 weeks group and 5 weeks training treated group decreased very significantly ($P < 0.001$); and 4 weeks training treated group decreased training treated group 5 weeks OD value is also very significant difference ($P < 0.01$).

Effect of the same exercise time

Training and drug intervention for 3 weeks, compared with the control group, the placebo group was significantly lower than the control group ($P < 0.01$), Voltaren group OD value was significantly higher than the control group ($P < 0.05$); compared with the placebo group, Xiaotong Plaster group and Votalin group OD value was significantly higher than that of the placebo group ($P < 0.001$). There was no significant difference between the two groups at 4 weeks and at the end of the 5 week.

DISCUSSION

The same situation in drug intervention, comparing the grouping of training time, Xiaotong group, and training 3 weeks of drug intervention group, training group and training intervention for 4 weeks 5 weeks of drug intervention group had significant difference, observed by OD, training 3 weeks of drug intervention group was significantly higher than the training of drug intervention group 4 weeks and 5 weeks of drug intervention group training and training; and 4 weeks of drug intervention group, training 5 weeks of drug intervention group was no significant difference, and found that 4 weeks of drug intervention group training and training 5 weeks of drug intervention group was little difference, and 3 weeks, 4 weeks, 5 weeks decreased, compared with the control group and exercise group in the training time the results reflect the Xiaotong injury in the treatment of sports, also through the medicine to express protein Repair and regeneration, and the treatment cycle is about 3 weeks.

Votalin group, 3 weeks of drug intervention and training group, training group and training intervention for 4 weeks 5 weeks of drug intervention group was decreased significantly, and the training of 4 weeks of drug intervention group, training 5 weeks of drug intervention group was also declined significantly, the same 3 weeks, 4 weeks and 5 weeks were the downward trend, and the peak time of occurrence and the downward trend and Xiaotong group performance is basically the same, indicating Votalin in chronic injury of muscle also tempts desmin expression of damage not only repair and regeneration, treatment cycle and Xiaotong treatment cycle, muscle repair cycle is basically the same.

In the placebo group, comparison between groups were not significantly different, and the OD value of observation, each time the OD values do not change greatly. According to the literature, through the research of scholars at home and abroad found that saline placebo on muscle injury and can not promote the repair effect, it is reported that 4 C saline in the outer external treatment can alleviate the effect of injury to muscle, but it can only reach the fixed effect on muscle cooling Town, only through the physical way to reduce tissue hematoma. Reduce the degeneration, has also been reported that saline can regulate the osmotic pressure of small amplitude, but the sports injury of muscle tissue repair to promote. There may also be a failure in the placebo group, resulting in no significant difference, and negative results, the reasons for further experimental study.

The main component of Voltaren ointment diclofenac (10 mg two triethylamine with diclofenac sodium). Is a topical anti-inflammatory and analgesic drug, such as by rubbing massage can make the active ingredients penetrate the skin, gathered in the subcutaneous tissue,

Table 1: Packet condition

	Classification	0 Week group	2 Week group	3 Week group	4 Week group	5 Week group
Control group	Exercise group	10	10	15	15	15
Drug intervention group	Xiaotong			15	15	15
	Votalin			15	15	15
	placebo			15	15	15
	Total	10	10	60	60	60

Table 2: Comparison of blank group and exercise group

type	OD
Blank group	0.4012±0.0251
2 week group	0.4897±0.0308
3 week group	0.5164±0.0196
4 week group	0.4503±0.0285
5 week group	0.3812±0.0174

Table 3: Comparison of training time under the same condition

time	Xiaotong Plaster	Votalin	placebo
3 week group	0.4708±0.0126	0.5124±0.0264	0.3856±0.0312
4 week group	0.4125±0.0312	0.4173±0.0159	0.4173±0.0359
5 week group	0.3850±0.0413	0.3582±0.0127	0.4015±0.0258

Table 4: Effects of different drugs in the same exercise time

medicine	3 week group	4 week group	5 week group
Xiaotong Plaster	0.4512±0.0213	0.4126±0.0521	0.3815±0.0483
Votalin	0.4918±0.0324	0.4352±0.0317	0.3570±0.0172
Placebo	0.3815±0.0369	0.4128±0.0506	0.4120±0.0186
Exercise control group	0.4592±0.0185	0.4273±0.0312	0.3516±0.0158

against acute and chronic inflammatory reaction. A large number of literatures show that Votalin has good analgesic and anti-inflammatory effects for sports injury, and can promote the recovery of sports injuries, said in the ointment experimental study on acute tendon injury of rabbit model role in Votalin in inhibiting PGE2 (prostaglandin E2) has obvious advantages on the synthesis of PGE2, the product is to stimulate local tissue inflammation, can increase the exogenous pain, PGE and severity of inflammation and pain degree were positively correlated. Therefore, it can effectively reduce inflammation, relieve pain, and has obvious anti-inflammatory effect. But Votalin in xiaozhongsanyu, reduce plasma viscosity, damage of tissue repair were inferior to the Department of Traumatology of No. 2 plaster. Voltaren ointment in the course of the experiment on egg expression and play an important role in it is found that the horizontal and vertical comparison, promote on egg white Votalin at 3 weeks, significantly higher than xiaotongtie group, placebo group and control group, and reached the peak in the 4 week began to decline, and continued to the end of the 5 week. With the OD value of control group and quiet group was flat, thus to determine

the Votalin intervention, desmin expression cycle than in the control group did not change in Votalin effect, did not shorten the repair cycle of chronic exercise-induced skeletal muscle injury, which is promoted by increasing the amount of protein expression in the repair process. No significant differences were found between the groups in the placebo intervention group.

CONCLUSION

The result shows that Xiaotong group for desmin expression enhancing effect is poor, Xiaotong Plaster on sports injury of the beginning of the two week intervention, third weeks OD value and exercise control group were unchanged, indicating that Xiaotong intervention has played virtually no effect after three weeks also showed a downward trend, but five weeks did not decline to quiet state remained at around the level of OD was higher than the quiet state. It can be explained that skeletal muscle repair has not yet been completed, it is concluded that the recovery time to the quiet level of the node should be shifted over time, resulting in an extension of the repair cycle. Thus, Xiaotong Plaster for

repair of chronic exercise-induced skeletal muscle injury basically no effect, but may prolong the time to repair. Compared with Voltalin Xiaotong drug intervention, Xiaotong of desmin role as ointment. Xiaotong during the whole experiment, the chronic injury of skeletal muscle regeneration process desmin expression did not play a role in promoting the Voltaren ointment during the whole experiment, the chronic injury of skeletal muscle regeneration process desmin expression plays a promoting role.

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