Extreme rainfall response based on SAR imaging and home sports training effect

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Received: 7 June 2021 / Accepted: 15 July 2021 / Published online: 26 July 2021
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Abstract
This paper establishes the value relationship model between the imaging performance of GEO bistatic SAR and bistatic geometry and proposes a design method of GEO bistatic SAR imaging method based on genetic algorithm. This method can automatically calculate the best imaging effect through multiple targets and objectively optimize the bistatic geometry configuration method, thus laying a theoretical foundation for high-resolution GEO imaging with bistatic SAR imaging. Accordingly, this study takes the response of Y City to extreme rainfall in 2017 as an example to study its rainfall characteristics, erosion disasters, and erosion causes, so as to evaluate the precipitation flow during rainstorm. Under the condition of gradient erosion in response to extreme rainfall, based on the difficulties of rainfall runoff depth and hydraulic parameters measurement in the Loess Plateau, and in order to prevent the dynamic characteristics of hydraulic erosion in the runoff area of the Loess Plateau, the unconventional scale phenomenon in the Loess Plateau was preliminarily studied. Finally, this paper introduces the research theme of the body and daily activities of the elderly women with mild disability after home exercise intervention and uses literature data method, questionnaire survey method, body measurement method, experimental method, and mathematical statistics method to select 60 elderly women with mild disability after home care. They were randomly divided into the experimental group with 30 people and the control group with the same number of people. In the experimental group, the elderly with mild disability were given a 12-week home exercise intervention experiment, and after the experiment, the indexes of physical fitness were compared with those before the experiment, so as to obtain the feedback of training effect and ability. Through the above experiments, this paper proves the reliability and effectiveness of home exercise intervention training on the improvement of the physical quality of the elderly.

Keywords SAR imaging · Extreme rainfall response · Home sports · Training effect

Introduction

Synthetic aperture radar (SAR) is based on high orbit illumination source, which uses high orbit SAR imaging satellite (GEO SAR) as light source while airborne or low orbit satellite (Leo SAR) as receiving station. The new bistatic SAR imaging system has the advantages of wide beam irradiation range, fast bistatic recovery, and powerful anti-reconnaissance detection function. In the military and civil fields, it also has standard dual configuration, echo attributes, imaging awareness, and moving target detection based on geo dual SAR imaging algorithm (Nyesheja et al. 2019). In this paper, theoretical analysis and simulation experiments are designed and implemented to verify the research content. In addition, based on the analysis of the response characteristics of extreme rainfall and the simulation of the similar characteristics of Y City, this study, with reference to the literature, combined with its content and according to the theoretical analysis, according to the research results of the research group, the uneven scale of extreme rainfall response, based on the research results of the research group, obtained the water flow including geometric gradient, velocity gradient, slope gradient, and density gradient (Ouabid et al. 2017). The research proves that it is necessary to measure the above data and strictly abide by the measurement regulations of water depth scale. According to the
investigation conclusions of the research group and the literature, an unconventional scale measurement method for extreme rainfall response and runoff sediment absorption was designed. The main factors considered are the same starting point, the same sediment load, the same surface deformation, and the same groundwater movement (Ouassou et al. 2006).

Finally, a set of data sets with the same geometric scale of extreme rainfall response in Y City is obtained, including the same flow movement, the same erosion and sediment decomposition, the same riverbed deformation, and the same groundwater movement. This data set is an unconventional scale relation data set. Finally, this paper aims to study the effect of home exercise intervention training on female elderly (Pal and Chakrabortty 2019). Home exercise intervention experiment is divided into many different items, such as resistance training, strength training, balance training, and flexibility training. In China, there are two ways for the elderly to exercise at home: one is Taijiquan, jogging, and the other is aerobic exercise. The intervention of aerobic exercise in the elderly has limited effect on improving their physical fitness (such as speed and balance). However, the influence of anaerobic exercise intensity and endurance training only for the elderly on their body shape and physical exercise is limited. Therefore, in order to obtain the maximum intervention effect, the above two training methods must be combined, and the elderly must carry out the comprehensive exercise intervention mentioned above in home sports, in order to obtain the best training effect (Pradeep et al. 2015).

**Materials and methods**

**Data source and preprocessing**

The vegetation index data are selected from GIMMS NDVI data products from 2000 to 2019. The data comes from NASA’s website. From 1982 to 2017, the meteorological data of daily temperature, maximum temperature, minimum temperature, and daily precipitation for 36 years were selected from 87 meteorological stations on the Loess Plateau.

The monthly NDVI value of the Loess Plateau is calculated, and the average value method is used to calculate the multi-year average value of the Loess Plateau, so as to establish the NDVI data set of the Loess Plateau from 1982 to 2017. In this paper, the NDVI values of 87 meteorological stations are used to determine the monthly average NDVI values of each meteorological station in the Loess Plateau from 1982 to 2017. Consistent with the RClImDex model, the maximum temperature index and the maximum rainfall index of each station, as well as the annual extreme climate index average, multi-year periodic average, and multi-year average monthly time series, are used to calculate the extreme climate index data set in the Loess Plateau Basin from 1982 to 2017, and Mann Kendall analysis method is used for analysis.

**SAR imaging algorithm design**

Compression detection theory shows that if the scattering coefficient of the target in the imaging scene is low, the scattering coefficient of the target in the original scene can be obtained from $L_0$ norm.

$$
\min_{\Gamma} \| \Gamma \|_0 \quad \text{s.t.} \quad S_d = \Theta_d \Gamma, i = 1, \ldots, \ldots \quad (1)
$$

By modifying the above formula (1) after lasso problem, we get that:

$$
\min_{\Gamma} \frac{1}{2} \left( S_d - \Theta_d \Gamma \right)^2 + \zeta \| \Gamma \|_1 \quad (2)
$$

Among them, $\zeta$ is the regularization parameter, and $\| \cdot \|_1$ is the ordinary $L_1$, which can be calculated by the following formula:

$$
\| x \|_1 = \sum_{i=1}^{n} |x_i| \quad (3)
$$

Calculate $L_1$ by the following formula:

$$
\| x \|_1 = \sum_{i=1}^{n} |x_i| \quad (4)
$$

**Statistical analysis method of extreme rainfall**

Wavelet transform (WT) is a great breakthrough in data analysis in the 1980s. By using this method, we can know the correlation between sunspots and periodicity and the annual change. The function used in this study is a complex Morlet function:

$$
\psi(t) = \frac{1}{\sqrt{\pi f_b}} e^{2\pi f_b t} e^{-\frac{t^2}{2}} \quad (5)
$$

The important information provided by Morlet complex is (a) energy density modulus, (b) singularity detection and fast frequency phase measurement, (c) the scale and location of wave (time-frequency), and (d) the square of the wavelength modulus that represents the energy spectrum and shows the change of energy in a specific range. The main phase of time series is obtained by the variability of wave:

$$
\text{Var}(a) = \Sigma (W_j(a, b)) \quad (6)
$$

The second and third maxima correspond to the second and third major cycles.
Research methods of home sports training effect

Through contact with international service organizations in S City, Barthel Index was used to detect the elderly at home, and female elderly who had reached mild disability (Barthel Index was 71–99) were selected. As the number of men who meet the conditions of mild disability is very small in the international organization for the care of the elderly, the main research objects of this paper are female elderly people with mild disability.

The selection and screening criteria of the subjects are as follows: (1) The subjects should be healthy, have healthy cardiopulmonary function and joint activity, and must meet the condition of “female elderly with mild disability.” (2) The subjects must voluntarily participate in all the rehabilitation activities required by the experiment. (3) The subjects should be over 60 years old but less than or equal to 70 years old. (4) The physical quality and some physiological characteristics of the experimental group and the control group should be consistent. (5) The subjects could not have any psychological and mental disorders. (6) The results of physical examination should prove that the old man is suitable for sports. (7) The elderly women with mild disability should actively participate in the investigation and intervention of this sport. (8) The subjects must be elderly women with local registered permanent residence or living in the local area for more than 3 months.

The study was divided into experimental group and control group. The experimental group was composed of 30 elderly women with mild disability, and the control group was the same as the experimental group. Before the intervention, the elderly women in the experimental group and the control group were tested, and then the elderly women in the experimental group were given 12 weeks of rehabilitation training. Rehabilitation exercise is expected from April 6, 2019, to July 10, 2019. The subjects in the control group still followed their original life style and rest style. It is expected that after 12 weeks of rehabilitation exercise, the training items of the two groups will be stopped, and the physical fitness indexes will be tested again.

Results

Cause analysis of extreme rainfall

The annual precipitation of Y City from 1957 to 2020 shows high instability and nonlinearity, and there is no obvious overall change (Fig. 1). In this study, a relatively small number of sunspots were used to determine the intensity of solar activity. Different from precipitation, the relative number of sunspots shows obvious daily variation (Fig. 1). Comparing precipitation and sunspot number, the general trend of precipitation change in Y City is the same as the relative number of sunspots. With the increase of the number of sunspots, the rainfall in Y City increases, and the maximum rainfall is mainly at the peak of the relative number of sunspots or about 2a.

In order to decompose the initial data and analyze the correlation between the relative number of sunspots and precipitation, this paper introduces the wavelet analysis method. Based on Murray wave analysis method, the wave coefficient contour map of precipitation time series is drawn at 64-year scale. The velocity at each point X–Y represents the magnitude of the wave coefficient. The real part of the Morlet wavelet complex coefficient is related to the phase and intensity of the signal changing at a specific position and the domain measure of frequency with time. In the wavelet precipitation coefficient, the positive phase coefficient indicates higher precipitation, and vice versa. It can be seen from the periodic change that, in fact, the rainfall structure of high rainfall stage and low rainfall stage is clearly displayed on different scales. The smaller the scale, the more complex it is, and it is nested in a higher scale.

The actual rainfall in area y of the Loess Plateau from 1957 to 2020 is shown in Fig. 2a. In Fig. 2a, the red area represents higher rainfall, the blue area represents lower rainfall, and the other colors represent the middle value of rainfall. As shown in Fig. 2a, on the 64-year scale, the precipitation change is consistent in 28–48 years and 10 years. In the range of 28–48 years, there are more than two oscillation periods.

Like wavelet precipitation analysis, Morlet wavelet analysis can decompose most sunspots from 1957 to 2020 in 64 years. Figure 3a–c shows the true phase, modulus, and module of the low solar spot coefficient. The relative number of sunspots shows a sudden change with time, especially on the 16-year scale. The module and module of volatility coefficient have two energy centers for 16 years.

The 10-year variation of the average precipitation curve and the Southern Oscillation Index (SOI) in Y City are analyzed. If the SOI is negative, the precipitation shows a downward trend, and vice versa. Consistent with the 10-year moving average curve, if El Niño events occur frequently, the precipitation in the same period usually shows a downward trend. As can be seen from Fig. 4, rainfall has been increasing since 1997.

Response of vegetation productivity to extreme rainfall

The design in Fig. 5b shows that LPX-Bern has special summer and autumn values in the 12 TREND models and the winter visit estimation is quite different from the typical model.

This study examined the potential impact of nine gpp1000 factors in China (Fig. 6b). Nine factors are cold, heat wave,
rainstorm, drought, low soil moisture, high soil moisture, excessive scPDSI, low scPDSI, and fire.

China has different climate systems, so the response of GPP to extreme events varies for various reasons. As shown

Fig. 1  Variation of rainfall and sunspot relative number in Y City

Fig. 2  Real part, modulus, and modulus square of rainfall wavelet coefficient contour map
in Fig. 7, according to TREND-GPP analysis, the extreme events in most areas are related to drought, especially in North China (66%) and N province (62%) while in South China (37%).

Fig. 3  The real part, modulus, and modulus square of the contour map of sunspot number wavelet coefficients

Fig. 4  Changes of precipitation and SOI index of Y City station from 1957 to 2020
The size of extreme events also depends on the sensitivity of the model. Therefore, the sensitivity of the modeling GPP to different indicators was analyzed to compare and evaluate the modeling during extreme events (Fig. 8).

**Home sports training effect analysis**

Before and after the rehabilitation exercise in the prescribed intervention measures, Table 1 lists the physical fitness test index values of the experimental group and the control group of the female elderly with mild disability.

Table 2 shows the test values of the physical function indexes of the experimental group and the control group before and after the specific rehabilitation exercise.

Body quality refers to the basic ability of human muscle activity, which can fully reflect the ability of human activity. It usually includes strength, balance, endurance, flexibility, and agility. The items of health assessment will vary according to people’s age. Before and after the prescribed rehabilitation exercise, Table 3 lists the physique test values of the experimental group and the control group of the female elderly with mild disability at home.
In the rehabilitation exercise intervention sequence, the scores of daily activity ability of the subjects in the home test experimental group and the control group are listed in Table 4.

Discussion

Theoretical basis of home rehabilitation exercise training prescription formulation

The physical and mental characteristics, personal health level, and the purpose of rehabilitation training should be fully considered when making rehabilitation exercise plan for the elderly women with mild disability and arouse their interest in rehabilitation intervention training, so that they can actively cooperate with rehabilitation and develop good habits of self-exercise rehabilitation. The preparation of rehabilitation training is carried out according to the scientific and effective methods of mediation rehabilitation training, so as to enhance physical fitness and improve daily activity skills.

The disabled elderly is a special group of the elderly. The skeleton, muscle, and various systems of the mildly disabled elderly are developing in a disadvantageous direction. And the reason is just because their muscles are weak. It is not impossible to complete some simple training activities of rehabilitation training, but the amount of exercise should be reduced (Naqvi et al. 2013).

In the rehabilitation exercise, the exercise intensity or the amount of intervention should not be too high, but the pre-designed amount of exercise should be consistent with their physical and physiological characteristics. As the elderly women with mild disability participate in sports irregularly, their joint activity, muscle strength, osteoporosis, and bone hyperplasia will decrease, and their balance ability will decrease. Therefore, it will lead to some problems such as muscle loss, muscle weakness, body fat increase, bone loss, vascular stiffness, and hypertension. Therefore, the physiological characteristics of the subjects must be considered in the design of intervention training.

The nervous system function of the elderly will gradually weaken with the growth of their age, so the elderly with mild disability is more prone to slow recovery after exercise than the ordinary elderly; therefore, in the design of rehabilitation prescription training, the elderly with mild disability is more likely to suffer from various sports diseases and be injured. Therefore, if we carry out prescription training for rehabilitation program, we...
must fully recognize this special situation, improve the safety of choosing prescription exercise rehabilitation program, and avoid or reduce the risk of the elderly (Moses 2017). According to the elements of medical prescription, on the premise of ensuring safety, we must also ensure that the rehabilitation effect introduced in the rehabilitation training plan meets the requirements of sports rehabilitation training.

If an elderly female with mild disability is intervened and received intervention rehabilitation training, she may not be able to train only a single muscle group. Therefore, the training program should have a positive impact on the overall muscle strength of the female elderly with mild disability, so that the effect of rehabilitation exercise intervention training can be more obvious.

The exercise plan design with prescription rehabilitation should not only suit the physiological characteristics of the disabled female elderly, but also conform to the rational principle. For example, rehabilitation training exercises will not exceed the range of joint motion of the elderly women with mild disability, provide safety training in rehabilitation exercise intervention, and minimize the risk factors (Michard et al. 2010).

### Analysis of the influence of home rehabilitation exercise training on body shape

Since the height of the human body will be stable during the growth and development of the human body, and the bone growth of the subjects with mild disability selected in the experiment has completely stopped, there is no significant change in some physical physiological indexes such as body height of the subjects in the experiment.

After the prescription intervention preparation experiment of rehabilitation treatment, according to the prescription intervention training of rehabilitation treatment, there was no significant effect on the body fat content of female elderly with mild disability ($P < 0.05$). After conducting the same study, other researchers also found that the body fat content of female elderly people did not change after the experiment compared with the previous experiment. Darryn Sdeng and others took 22 untrained adult men as subjects and provided them with a 12-week strength training course (Kouli et al. 2009). After the experiment, they found that endurance training did not significantly reduce body fat in untrained male subjects. Cris A et al. used 249 overweight adults aged 18 to 70 as subjects and divided them into two groups. One group took resistance exercise twice a week, and the other group took aerobic exercise twice a week for 10 weeks. After 10 weeks, the body fat content of endurance exercise group and aerobic exercise group was compared (López-Vicente et al. 2008). The subcutaneous fat content did not change in the resistance group. This shows that resistance exercise is not as good as

![Fig. 8 Comparison of sensitivity of GPP to extreme weather events such as extreme rainfall and drought in 13 models](image)

| Test group | Control group |
|------------|---------------|
| **N** | **x±s** | **N** | **x±s** | **t** | **P** |
| Height (m) | 30 | 1.62±0.25 | 30 | 1.62±0.192 | 1.401 | 0.167 |
| Weight (kg) | 30 | 60.93±5.06 | 30 | 61.40±4.00 | −0.732 | 0.467 |
| BMI (kg/m²) | 30 | 23.19±1.35 | 30 | 23.65±1.39 | −2.449 | 0.017* |
| Body fat percentage (%) | 30 | 33.58±4.48 | 30 | 34.94±4.57 | −1.167 | 0.248 |
aerobic exercise in reducing total body fat. Some researchers have come to the conclusion that even if endurance training does not reduce body fat, it can also prevent the increase of body fat in the elderly. Dennis R et al. used 13 healthy men and women living in the community as subjects, aged between 65 and 80. The subjects received 24 weeks of resistance training, and after 12 weeks of resistance training, the muscle fat infiltration of 13 subjects in the study decreased. The conclusion of the experiment is that resistance training can improve the quality of skeletal muscle and reduce the fat absorption in human muscle, so as to maintain the stability of body fat (Geddes and Dunkerley 1999).

The conclusion of this study is the result of experimental study on the preparation of intervention measures in rehabilitation exercise prescription. According to the research, the prescription of rehabilitation exercise for the elderly women with mild disability at home mainly focuses on strength training, but the amount of aerobic exercise is insufficient. Although the body weight, body fat percentage, and BMI of the subjects improved, they still did not get significant improvement (Lu et al. 2004). Due to the natural reduction of human muscle, body fat may increase, but after the intervention of rehabilitation exercise in the experimental group, body fat did not increase, and slightly improved, which was not shown in the direct rehabilitation exercise mode, and the effect was not obvious, so it needs to be further improved in the future research (Mahala 2018).

Analysis of the influence of home rehabilitation exercise training on blood function

After 12 weeks of intervention training, the heart rate of the subjects in the experimental group was not significantly improved compared with the previous ($P > 0.05$), but compared with the control group, the heart rate of the subjects in the control group was not significantly improved ($P > 0.05$). Fleur Poelkens et al. studied 56 healthy elderly people aged between 64 and 78. They received unilateral upper and lower limb endurance training for 10 weeks. After 10 weeks of resistance training, they found that the resting heart rate of 12 healthy old people changed. The most important influence on resting heart rate is the autonomic nerve in the human body. Because of the repeated times of exercise and the intensity of stimulation, the internal intervention in this rehabilitation exercise intervention experiment may have no effect on the autonomic nerve function. Therefore, there is no significant change in the resting heart rate of the female elderly with mild disability (Ennih and Liégeois 2001).

The experimental results show that prescription exercise plays an important role in reducing the systolic and diastolic blood pressure of the elderly women (Djoukbala et al. 2018). After resistance training, the body’s blood pressure will immediately change adaptively. After resistance training, different training intensity, different subjects, different blood pressure, and different post-test period have different effects on human blood pressure. Fabiano Moraes Miguel took healthy adult women and hypertensive adult women as subjects and designed relevant experimental programs to train them. It was found that after resistance training intervention, the changes of systolic blood pressure, heart rate, and heart rate blood pressure product of adult women with hypertension were more obvious than those of healthy adult women (Bouderbala et al. 2019). Resistance training has been shown to improve cardiac function in adult women with short-term hypertension. Cunha took 63 female elderly people as the research object and carried out resistance training for them after the experiment in the experimental group.

Table 2  Comparison of mean blood pressure and heart rate for elderly women with mild disability in home care before and after the experiment in the experimental group

|                         | Before          | After           | t   | P     |
|-------------------------|----------------|----------------|-----|-------|
| Systolic blood pressure (mmHg) | 30 130.23±18.46 | 30 118.23±7.10 | 5.22 | 0.000** |
| Diastolic blood pressure (mmHg) | 30 73.83±5.34   | 30 72.46±4.73  | 2.34 | 0.026*  |
| Heart rate (times)       | 30 71.00±7.14   | 30 70.53±6.51  | 1.17 | 0.25   |

Table 3  Comparison of average physical fitness of elderly women with mild disability in home care before and after the experiment in the experimental group

|                         | Before          | After           | t   | P     |
|-------------------------|----------------|----------------|-----|-------|
| Grip strength (kg)      | 30 27.37±2.66   | 30 28.13±2.65  | −3.218 | 0.003** |
| Standing on one foot (s) | 30 3.73±0.83    | 30 5.10±0.88   | −2.362 | 0.025*  |
| CS-30 (times)           | 30 9.20±0.99    | 30 9.63±0.85   | −2.091 | 0.045*  |
| Sitting forward bending (cm) | 30 10.80±3.13   | 30 11.30±3.57  | −1.881 | 0.070*  |
| Response time (s)       | 30 0.479±0.033  | 30 0.473±0.044 | 0.832 | 0.412   |
After resistance training, it was found that the immediate diastolic blood pressure and systolic blood pressure had little change. However, 60 min after the resistance training experiment, the diastolic and systolic blood pressure of the subjects were measured, and it was found that the diastolic and systolic blood pressure changed significantly. Therefore, the researchers believe that the reason for the impact of female elderly blood pressure is not resistance training itself but the impact of resistance training (Chafai et al. 2020).

**Analysis of the influence of home rehabilitation exercise training on physical fitness**

Endurance training can effectively improve the muscle strength of the elderly, prevent muscle relaxation, and reduce muscle strength, so as to reduce the possibility of falls in the elderly. In this experiment, through the intervention training for prescription rehabilitation, we found that compared with the control group ($P > 0.05$), the grip strength of the experimental group was significantly improved ($P < 0.05$).

Sarcopenia is a condition in which muscle weight and strength decrease with age. Exercise is the simplest and most effective way to prevent sarcopenia in the elderly (Bouchaou et al. 2008). Many experiments of researchers have reached the same conclusion: resistance training can improve the muscle strength of the elderly, so as to improve their health. Through the research and analysis of a large number of literatures at home and abroad, we can know that strength training can further improve the muscle strength of the elderly and improve their sports ability. Paolo Capodaglio and others took 19 healthy old men and 19 healthy old women as the research objects and carried out a comprehensive exercise training for 1 year (Benselama et al. 2018). The training frequency is twice a week. After the experiment, it was found that the motor function of elderly men and women was relatively improved. However, this study does not clarify whether the improvement of motor function in elderly men and women is caused by strength training or other sports. Daniel A. Galvao et al. studied 28 elderly men and women living in the community. They were trained twice a week for at least 20 weeks using the equipment. After a 20-week exercise experiment, they found that older men’s lower limb strength and gait increased significantly, as did older women. The results clearly show that strength training can effectively improve the physical fitness and sports ability of the elderly.

The rehabilitation prescription also increases strength training. Therefore, it can be considered that the active research is consistent with the results of this study, and strength training has a significant effect on improving the muscle strength of the elderly (Aydda et al. 2019). Therefore, the results of the experimental study on rehabilitation exercise intervention are considered to be reliable.

**Analysis of the influence of home rehabilitation exercise training on the ability of daily activities**

Many literatures point out that exercise intervention can improve the ability of daily activities of the elderly. Huang, Lin, and other 89 elderly people were divided into experimental group (47 people) and control group (42 people). The experimental group was intervened by aerobic exercise and strength training. The control group did not take any intervention measures for 6 months. Six months later, the Barthel Index scores of the experimental group and the control group were tested (Abuzied et al. 2016). The test results showed that the Barthel Index scores of the experimental group were significantly higher than those before the experiment, while the Barthel Index scores of the control group were not significantly higher than those before the experiment. The Barthel Index of the experimental group was higher than that of the control group. In conclusion, exercise intervention can improve ADL of the elderly with mild disability (Alexakis et al. 2013). Two hundred elderly subjects were divided into 100 experimental group and control group, and in the experimental group, the elderly self-intervention exercise was promoted. The elderly in the control group did not receive any intervention. After 1 year’s experiment, it was found that the ability of daily activities (ADL) of the elderly in the experimental group was significantly improved compared with that before the experiment, while the ability of daily activities (ADL) of the elderly in the control group had no change compared with that before the experiment. Compared with the control group, the ability of daily activities (ADL) of the elderly in the experimental group was significantly improved. The conclusion of the experiment is that the independent exercise program has

### Table 4 Daily activity ability scores of the experimental group and the control group before and after rehabilitation exercise intervention training

| Group    | Before | After | $P$ value between groups |
|----------|--------|-------|--------------------------|
| Test     | N=30   | x±s   | N=30                     | 0.904 |
|          | 80.33±5.40 | 86.33±3.20 | 0.000** |
| Group    | N=30   | x±s   |                           | 0.184 |
|          | 80.50±5.31 | 80.00±5.72 | 0.000** |

The test results showed that the Barthel Index scores of the experimental group were significantly higher than those before the experiment, while the Barthel Index scores of the control group were not significantly higher than those before the experiment. The Barthel Index of the experimental group was higher than that of the control group. In conclusion, exercise intervention can improve ADL of the elderly with mild disability (Alexakis et al. 2013). Two hundred elderly subjects were divided into 100 experimental group and control group, and in the experimental group, the elderly self-intervention exercise was promoted. The elderly in the control group did not receive any intervention. After 1 year’s experiment, it was found that the ability of daily activities (ADL) of the elderly in the experimental group was significantly improved compared with that before the experiment, while the ability of daily activities (ADL) of the elderly in the control group had no change compared with that before the experiment. Compared with the control group, the ability of daily activities (ADL) of the elderly in the experimental group was significantly improved. The conclusion of the experiment is that the independent exercise program has
a positive effect on improving the ability of daily activities (ADL) of the elderly.

Conclusion

In this study, the Froude index of smooth aluminum-plastic plate, coarse sand, and straw mat were calculated under the conditions of four slopes and five slopes, and the slope and flow roughness of the lower surface were studied. The results show that with the increase of the roughness of the lower surface, the Froude index on the surface of different research objects becomes smaller and smaller. Under the same slope condition, the Froude values of the aluminum-plastic plate and the convex plate on the bed surface increase with the increase of the flow rate, while the slope decreases with the increase of the flow rate. Finally, the effect of home exercise is investigated. Based on the research results, this paper believes that exercise rehabilitation program can improve the daily activity ability and physical fitness of the elderly with mild disability. Strength training and aerobic exercise can further improve the physical health and activities of daily living of the elderly women with mild disability.

Declarations

Conflict of interest The authors declare that they have no competing interests.

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