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The Impact and Intervention of Handheld Tai Chi Water-Resistance Fitness Ball on Middle-Aged and Elderly Patients with Parkinson's Disease

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Abstract

Through the use of a survey and statistical methods, this study explores the effects and interventions of handheld Tai Chi water resistance fitness balls on the elderly with Parkinson's disease. Firstly, a questionnaire on exercise compliance for patients with Parkinson's disease was developed, and its reliability and validity were tested. Then, a survey was conducted to investigate the current status of exercise compliance among Parkinson's disease patients, including general information, scoring status, and single and multiple factor analyses of influencing factors [1]. The results of the study show that through qualitative research, the dimensions and item pools of the questionnaire were initially constructed, and the reliability analysis of the questionnaire was conducted through Delphi expert consultation, with favorable results in terms of its reliability and validity [2]. Regarding the current status of exercise compliance among Parkinson's disease patients, the study found that the level of exercise compliance needs improvement, and there are significant differences in exercise compliance levels among patients under different circumstances. Finally, the research results were discussed and conclusions were drawn. The innovation of this study lies in the development of a questionnaire on exercise compliance for patients with Parkinson's disease and the preliminary qualitative research and Delphi expert consultation conducted on it, providing new ideas and methods for the study of exercise compliance. However, the study also has limitations as it did not examine the effects of other interventions on Parkinson's disease, so further research should be conducted [3].

Keywords

Parkinson's Disease, Exercise Compliance, Tai Chi Water Resistance Fitness Ball, Influencing Factors, Intervention Effectiveness

1. Introduction

1.1. Research Background and Significance

Parkinson's syndrome is common in middle-aged and elderly people, and is a neurological degenerative disease, mainly manifested by muscle stiffness, tremors and movement disorders and other symptoms, seriously affecting the quality of life and health of the elderly. With the aging of the population, the prevalence of Parkinson's disease is also on the rise. Among current treatments, functional exercise is widely used and has been shown to have a positive impact on Parkinson's patients [4].

In practical application, it was found that the compliance of functional exercise in middle-aged and elderly patients with Parkinson's disease was generally low. High-intensity exercise and complex exercise movements make patients have many difficulties in the process of adhering to exercise, such as lack of motivation, do not understand the exercise method and so on. At present, there are few researches on functional exercise compliance of patients with Parkinson's disease at home and abroad, lack of systematic investigation and analysis.

Therefore, the purpose of this study was to explore the influence and intervention of handheld Tai Chi water resistance fitness ball on middle-aged and elderly Parkinson's syndrome, and to investigate and analyze the functional exercise compliance of Parkinson's patients. Through this study, we can deeply understand the status quo of functional exercise compliance in middle-aged and elderly patients with Parkinson's disease, and provide theoretical basis for formulating reasonable intervention measures. In addition, the functional training of Tai Chi water resistance fitness ball focuses on the cultivation of flexibility, balance and coordination of the body through a series of continuous, gentle and smooth movements. Through the flow of water in the body to activate the nerve reflex speed of small muscles in this process, the patient needs to continuously push and shake the water balloon with the hand, in the adjustment of strength and rhythm, to train the coordination and balance of the body. At the same time, the training of Tai Chi water resistance fitness ball also pays attention to psychological relaxation and breathing regulation, which can effectively relieve patients' anxiety and tension and improve their mental state.

The unique aspect of the training of the Tai Chi Water Resistance Fitness Ball is that it focuses on holistic mind-body harmony. By turning and pushing the sphere, the patient can adjust, balance and coordinate various parts of the body during movement, improving muscle flexibility and joint range of motion. At the same time, it can stimulate the function of the nervous system and improve the coordination and control ability of the brain. These comprehensive and coherent body movements and nervous system stimulation can help patients recover muscle function, reduce the symptoms of tremor and stiffness, and improve the flexibility and accuracy of action. Through this study, it can provide new ideas and methods for the rehabilitation treatment of Parkinson's patients.

This study mainly used questionnaire survey and statistical methods. Firstly, a

questionnaire on functional exercise compliance of patients with Parkinson's disease was compiled. The questionnaire dimensions and item pool were initially constructed, and the items were determined by Delphi method, and the reliability and validity of the questionnaire were tested [5]. Then, the status quo of functional exercise compliance in patients with Parkinson's disease was investigated, including the collection of general data and functional exercise compliance scores. Finally, statistical methods were used to analyze the study results and explore the influencing factors of functional exercise compliance in patients with Parkinson's disease.

Through this study, we can comprehensively understand the status quo of functional exercise compliance in middle-aged and elderly patients with Parkinson's disease, and provide scientific basis for formulating intervention measures. In addition, as a new type of exercise, the handheld Tai Chi water-resistance fitness ball is worth further research and exploration on the influence of middle-aged and elderly patients with Parkinson's disease. The results of this study have important practical significance for improving the compliance of functional exercise and improving the quality of life of middle-aged and elderly patients with Parkinson's disease.

1.2. Status Quo of Functional Exercise Compliance of Parkinson's Patients at Home and Abroad

The status of functional exercise compliance in patients with Parkinson's disease has received extensive attention from researchers at home and abroad. Often, people with Parkinson's disease need to perform functional exercises to alleviate symptoms of the disease and improve quality of life. However, studies have found that Parkinson's patients have varying degrees of problems in their compliance with functional exercise. Especially in the maintenance of long-term exercise, patients often experience a decline in compliance. This will not only affect the recovery and quality of life of patients, but also increase the economic burden of patients' families and society.

There are some common characteristics of functional exercise compliance in patients with Parkinson's disease. On the one hand, patients recognized the importance and effect of functional exercise and had a higher willingness to exercise. However, on the other hand, due to the characteristics of Parkinson's disease itself, patients often have problems with exercise ability and endurance, which affects their long-term exercise compliance.

In domestic and foreign studies, experts and scholars have also proposed some intervention measures to promote functional exercise compliance of patients with Parkinson's disease. For example, incorporating functional exercise into routine behaviors of patients' daily lives, providing personalized exercise guidance and advice, and support from relatives, doctors, and the community. These interventions can not only remind and motivate patients to exercise, but also improve patients' exercise motivation and effectiveness. In addition, some studies have found that functional exercise compliance in patients with Parkinson's

disease can be improved by using new types of exercise equipment, such as the handheld Tai Chi water resistance fitness ball. This kind of exercise equipment has the advantages of simplicity, wide applicability and obvious effect, and has great potential for functional exercise of patients with Parkinson's disease.

In general, there are some problems in the status quo of functional exercise compliance of Parkinson's patients at home and abroad, which need to be paid attention to. Through understanding and analyzing these problems, we can provide some reference and basis for designing and carrying out intervention measures. It is hoped that this study can further investigate the status quo of functional exercise compliance in patients with Parkinson's disease, and provide effective intervention measures to improve patients' exercise compliance and quality of life. At the same time, we also hope to use the advantages of the handheld Tai Chi water resistance fitness ball to promote the functional exercise effect and compliance of Parkinson's patients.

1.3. Definition of Related Concepts

1.3.1. The Significance of Functional Exercise and a Critical Review of Previous Research

Functional exercise plays a crucial role in improving the overall physical capabilities and quality of life for individuals with Parkinson's disease. Parkinson's disease is a progressive neurodegenerative disorder characterized by motor symptoms such as tremors, rigidity, and bradykinesia. These symptoms often lead to a decline in functional abilities, making it essential for individuals with Parkinson's disease to engage in regular exercise [6].

Functional exercise aims to improve an individual's ability to perform activities of daily living, such as walking, balancing, and reaching. This type of exercise focuses on movements that mimic real-life activities and are specifically tailored to improve functional abilities. It encompasses a combination of aerobic exercise, strength training, flexibility training, and balance exercises.

Research has shown that functional exercise can significantly improve motor symptoms, balance, mobility, and overall physical functioning in individuals with Parkinson's disease. Some benefits of functional exercise include increased muscle strength, improved balance and coordination, enhanced cardiovascular fitness, and reduced falls risk. Incorporating functional exercise into the daily routine of individuals with Parkinson's disease can positively impact their physical and functional abilities. However, adherence to exercise programs among individuals with Parkinson's disease remains a persistent challenge. Factors such as lack of motivation, physical limitations, and difficulties in maintaining an exercise routine often contribute to non-compliance with exercise recommendations.

Addressing these challenges and improving adherence to functional exercise programs is crucial for maximizing the benefits of exercise interventions in individuals with Parkinson's disease. Therefore, it is essential to develop effective strategies to enhance compliance with functional exercise among individuals

with Parkinson's disease. This study aims to investigate the effects of a handheld Tai Chi water resistance fitness ball on functional exercise adherence among middle-aged and elderly individuals with Parkinson's disease.

By understanding the factors that influence adherence to functional exercise programs and exploring innovative interventions such as the handheld Tai Chi water resistance fitness ball, this study aims to contribute to the development of effective and sustainable exercise interventions for individuals with Parkinson's disease. Through a comprehensive analysis of the research findings, this study seeks to provide valuable insights that can inform future interventions and promote better functional outcomes for individuals with Parkinson's disease.

The hand-held water-resistance fitness ball is a new kind of fitness equipment, and its application in the functional exercise of patients with Parkinson's disease has attracted much attention. Through in-depth research and critical review, we can better understand the significance of this exercise and its impact on the health of patients.

As a new exercise tool, the handheld water resistance fitness ball combines the water resistance and the movement characteristics of the ball, which can provide a new exercise experience for Parkinson's disease patients. By holding the ball in the water, the patient can exercise strength and coordination without external influence, effectively improving their muscle function and movement ability. This type of exercise can not only enhance the physical fitness of patients, but also enhance their interest in exercise and continuity, which helps patients better adhere to exercise.

Second, through a critical review of previous research, we can find some issues of concern. For example, some studies may have insufficient sample sizes, poorly designed experiments, or ambiguous interpretation of results. These problems may affect the reliability and scientificity of research conclusions, so it is necessary to pay more attention to the rigor of research methods and the reliability of results when conducting research, so as to ensure the scientificity and practicality of research results.

In summary, the handheld water resistance fitness ball is of great significance in the functional exercise of Parkinson's disease patients. With this form of exercise, patients can improve their muscle function and coordination, improve their motor capacity and quality of life. However, when conducting relevant research, we should also pay attention to critical thinking, and be careful about research design and interpretation of results to ensure that the research is scientific and practical. Only in this way can we better understand the role of hand-held water resistance fitness balls in patients with Parkinson's disease and provide stronger support for relevant clinical practice.

1.3.2. Compliance

Adherence refers to an individual's acceptance of and adherence to medical and rehabilitation measures. In patients with Parkinson's disease, functional exercise compliance refers to the patient's active cooperation with the doctor's order and

the initiative of the functional exercise guidance. The compliance of Parkinson's patients with functional exercise will directly affect their rehabilitation effect and quality of life.

In this study, the functional exercise compliance of patients with Parkinson's disease was objectively assessed through the preparation of functional exercise compliance questionnaire. Firstly, through qualitative research, we initially constructed a questionnaire with various dimensions and item pools, including patients' attitudes, beliefs, behaviors and knowledge. In this process, we adopted the methods of literature analysis and expert consultation, and carried out extensive investigation and discussion on the construction of the questionnaire. Through qualitative study, we obtained the preliminary content of functional exercise compliance questionnaire for patients with Parkinson's disease.

Then, we used Delphi method to determine the items in the questionnaire. The Delphi method is a method of multiple rounds of anonymous expert evaluation and discussion in which the questionnaire entries are evaluated and revised by experts. Through multiple rounds of Delphi expert correspondence, we obtained the definitive results of the questionnaire items. The Delphi method can effectively pool the wisdom of the experts, summarize and integrate the opinions, and ensure that the questionnaire design is reasonable and has a high credibility.

We tested the reliability and validity of the functional exercise compliance questionnaire for patients with Parkinson's disease. The questionnaire was tested and verified by recruiting a certain number of patients with Parkinson's disease as samples. We used statistical methods, including internal consistency analysis, retest reliability analysis and factor analysis, to evaluate the reliability and validity of the questionnaire. Through these analyses, we can judge the reliability and validity of each dimension and item of the questionnaire, and further improve and optimize the design of the questionnaire.

Through the above research methods, we will obtain the results of the preparation of functional exercise compliance questionnaire for Parkinson's patients. This will provide an objective basis for understanding the status quo of functional exercise compliance in patients with Parkinson's disease, and further study the influencing factors of functional exercise compliance in patients with Parkinson's disease. At the same time, it also provides a theoretical basis for the intervention of functional exercise compliance of Parkinson's patients, and provides scientific guidance for the rehabilitation and health of middle-aged and elderly Parkinson's patients.

2. Research Methods

2.1. Preparation of Functional Exercise Compliance Questionnaire for Patients with Parkinson's Disease

2.1.1. Preliminary Construction of Questionnaire Dimensions and Item Pool

In order to compile a functional exercise compliance questionnaire for patients

with Parkinson's disease, this study conducted a preliminary construction of questionnaire dimensions and item pool. First of all, the research team conducted a comprehensive review and analysis of relevant literature, and determined the theoretical basis and research framework of questionnaire design. On this basis, combined with clinical experience and expert opinions, the questionnaire dimensions and item pool suitable for the assessment of functional exercise compliance of Parkinson's patients were constructed.

When constructing the dimensions of the questionnaire, this study took into account the characteristics of functional exercise in patients with Parkinson's disease and the influencing factors of compliance. Firstly, the objective, content, frequency, intensity and other related factors of functional exercise in patients with Parkinson's disease were taken as a dimension. Secondly, personal factors such as age, gender, education level, occupation, etc. are included in another dimension. Third, external factors such as social support, family environment, and economic conditions are included in the third dimension. Finally, psychological factors such as Parkinson's patients' attitude, knowledge level and behavior belief towards functional exercise were included in the fourth dimension.

In determining the questionnaire items, the research team used a variety of methods. Firstly, keywords related to functional exercise compliance were extracted from the above dimensions as the basis for constructing questionnaire entries. Then, through expert discussion and opinion collection, the preliminary articles were modified and improved. After repeated discussion and modification, the items of the functional exercise compliance questionnaire for patients with Parkinson's disease were determined.

The dimensions and item pool of the questionnaire preliminarily constructed in this study not only took into account the characteristics of functional exercise of patients with Parkinson's disease, but also took into account multiple influencing factors of compliance. Through this work, it lays a foundation for the follow-up questionnaire preparation and reliability and validity test. However, it should be noted that the questionnaire is only preliminary and needs to be further modified and improved in subsequent empirical studies. At the same time, in the process of questionnaire preparation, it is necessary to fully consider the differences in cultural background and language expression to ensure the effectiveness and accuracy of the questionnaire.

2.1.2. Determination of Questionnaire Items by Delphi Method

Delphi method is a research method to reach consensus through expert opinions and suggestions, which is widely used in the determination of questionnaire items. In this study, we used the Delphi method to determine the entries of the functional exercise compliance questionnaire in patients with Parkinson's disease.

In the process of Delphi method, we collected the preliminary opinions and suggestions of the experts on the questionnaire items through the first round of expert discussion. In the discussion, the experts presented a number of articles

related to functional exercise compliance in patients with Parkinson's disease, covering exercise frequency, exercise style, exercise duration, exercise movements, etc. After sorting and refining the opinions of the experts, we got a preliminary pool of questionnaire entries.

Following this, two rounds of Delphi expert correspondence were conducted by continuing to solicit expert opinions and recommendations. In each round of correspondence, we sent a pool of questionnaire entries to the experts and asked them to evaluate and revise them according to their own expertise and experience. Experts evaluated the items according to their accuracy, applicability, importance, etc., and put forward suggestions and suggestions for modification. As the Delphi method progresses, the number and scope of articles gradually narrows, and the opinions of experts gradually converge. Finally, after two rounds of Delphi expert correspondence, we got a questionnaire item with high feasibility and reliability.

The items of the functional exercise compliance questionnaire for patients with Parkinson's disease were determined by Delphi method, and the reliability and validity of the questionnaire were tested. Through this research method, we obtained a questionnaire with high feasibility and reliability, which provided an effective tool and basis for the follow-up investigation of the status quo of functional exercise compliance. The information we mentioned in the research is the conclusion reached through investigation, inspection and analysis, and these conclusions are based on the measured data and research process, with a certain scientific and reliable.

2.1.3. Reliability and Validity Test of Functional Exercise Compliance Questionnaire for Patients with Parkinson's Disease

The objective of this study was to explore the influence and intervention of handheld Tai Chi water-resistive fitness ball on functional exercise compliance in middle-aged and elderly patients with Parkinson's syndrome. In order to achieve this goal, questionnaire survey and statistical methods were used in this study.

Among the research methods, an important work is to compile functional exercise compliance questionnaires for Parkinson's patients. In order to ensure the reliability and validity of the questionnaire, a series of steps were adopted in this study. Firstly, through qualitative research, the questionnaire dimensions and item pool are constructed. Qualitative research is a method of in-depth understanding and sorting out related concepts through interviews and observations of patients and medical staff. Based on these initially constructed dimensions and item pools, the present study developed a draft functional exercise compliance questionnaire for Parkinson's patients.

In order to ensure the accuracy and rationality of the questionnaire content, the Delphi method was used in this study. Delphi method is a method to gradually improve the content of the questionnaire by reaching a consensus through multiple rounds of expert consultation. This study selected a group of expe-

rienced Parkinson's disease experts as Delphi experts, and conducted several rounds of consultation by telephone or email. After these consultations, this research revised the contents and items of the questionnaire according to the opinions of experts, and formed the final draft of the questionnaire.

In order to verify the reliability and validity of the questionnaire, this study conducted a reliability and validity test. First, this study selected a part of Parkinson's disease patients as research objects and conducted a questionnaire survey on them. Then, the reliability of the questionnaire was analyzed by statistical methods. In the reliability analysis, the test retest method was adopted in this study, the questionnaire was re-measured after a period of time between two measurements, and the correlation analysis was conducted between the two measurement results. Then, the validity of the questionnaire was analyzed. In the validity analysis, a factor analysis method was used to determine whether the structure of the questionnaire met the expectations, and the validity of the questionnaire was evaluated by calculating the factor load value and the common cause variance explanation ratio.

In this study, questionnaires and statistical methods were used to compile functional exercise compliance questionnaires for patients with Parkinson's disease, and their reliability and validity were tested. This provides a reliable survey tool and basic data for the follow-up investigation of the status quo of functional exercise compliance.

2.2. Investigation on the Status Quo of Functional Exercise Compliance of Parkinson's Patients

2.2.1. Research Object and Method

The research object and method of functional exercise compliance in patients with Parkinson's disease play a key role in this study. First, we need to identify the subject of the study, namely Parkinson's patients. In this study, we chose to investigate and analyze middle-aged and elderly patients with Parkinson's syndrome. This choice is because the middle and old age is the period of high incidence of Parkinson's disease, and the adherence of this population to exercise is also worth exploring [7].

After identifying the research object, we need to define the research method. In this study, questionnaire survey was used to collect data. Questionnaire survey is a commonly used research method, which can effectively obtain a large amount of information and carry out statistical analysis of this information. We will design a functional exercise compliance questionnaire for patients with Parkinson's disease, and obtain their compliance in functional exercise through questionnaire survey of patients [8].

In order to ensure the quality and validity of the questionnaire, we adopted Delphi method to determine the items of the questionnaire. The Delphi method is a method of gradually determining the items in the questionnaire over multiple rounds of expert discussion and solicitation of opinions. Through the Delphi method, we can solicit the opinions and suggestions of experts, and revise

and improve the questionnaire according to their opinions to ensure the accuracy and reliability of the questionnaire.

For the reliability and validity test of the questionnaire, we will use statistical methods to analyze. By collecting a large amount of questionnaire data, we will test the reliability and validity of the questionnaire. For example, Cronbach's alpha coefficient of the questionnaire was calculated to evaluate the reliability of the questionnaire, and the structure-activity validity of the questionnaire was evaluated by factor analysis. These statistical methods can help us evaluate the reliability and validity of the questionnaire, and further ensure the scientific and reliability of the research.

This study will investigate the status quo and influencing factors of functional exercise compliance of patients with Parkinson's disease through questionnaire survey of middle-aged and elderly patients with Parkinson's disease. Through carefully designed questionnaires and scientific and effective statistical methods, important information about functional exercise compliance of patients with Parkinson's disease will be obtained, providing basis and reference for future intervention measures.

2.2.2. Research Tools

The research tools of this study mainly include functional exercise compliance questionnaire and general data questionnaire for Parkinson's patients.

The functional exercise compliance questionnaire for patients with Parkinson's disease was developed according to the research objectives and questions of this study. In order to ensure the validity and reliability of the questionnaire, this study adopts a variety of methods to compile and verify the questionnaire.

On the one hand, through the review of relevant literature and expert interviews, the questionnaire dimensions and item pool were initially constructed. The questionnaire covered different aspects of functional exercise compliance in patients with Parkinson's disease, including exercise frequency, exercise duration, exercise intensity, exercise posture, etc. The comprehensiveness and diversity of the questionnaire are ensured by constructing each dimension and item pool.

On the other hand, the Delphi method is used to determine the items of the questionnaire. Delphi method is an expert consultation method, through multiple rounds of expert opinion collection and summary, the final expert consensus. This study invited experts in related fields to collect and integrate their opinions and suggestions on various items of the questionnaire through email or online questionnaires. After several rounds of Delphi expert correspondence, the final questionnaire items were determined.

The reliability and validity of functional exercise compliance questionnaire for patients with Parkinson's disease were tested. Through a questionnaire survey of 100 patients with Parkinson's disease, the questionnaire data were collected, and the reliability and validity were analyzed statistically [9]. Cronbach's alpha coefficient was used to calculate the reliability of the questionnaire, and the results

showed high internal consistency of the questionnaire. At the same time, the validity and rationality of the questionnaire were verified by factor analysis and correlation analysis [10].

In addition to the functional exercise compliance questionnaire, the study also collected general data of Parkinson's patients, including gender, age, course of disease, and medication. These data can be used to analyze the basic situation of Parkinson's disease patients and provide a basis for subsequent data analysis [11].

Overall, the research tools used in this study included the functional exercise compliance questionnaire and the general data questionnaire for Parkinson's patients. The reliability and validity of the questionnaire are ensured through the reasonable process of questionnaire preparation and verification. At the same time, the general data collected can provide the basic situation of Parkinson's patients and provide a basis for subsequent data analysis [12].

2.2.3. Collection of Data

Data collection is an important link in this study. In order to obtain accurate and comprehensive data, this study adopts a variety of methods to collect data.

On the one hand, we contacted a number of hospitals and community rehabilitation centers, asking for their cooperation and support. After obtaining the consent of the relevant agencies, we have established a good cooperative relationship with them. Through these partners, we were able to reach a certain number of people with Parkinson's disease and send them questionnaires.

On the other hand, we conducted individual interviews with Parkinson's patients in a face-to-face manner. Individual interviews can better understand patients' attitudes and behaviors towards functional exercise compliance and provide more detailed and authentic information. During the individual interviews, we fully respected the privacy and informed consent of the patients, and communicated with them to explain the purpose and significance of the study.

In addition, we also collected data by way of observation and recording. We observed patients as they performed functional exercise activities and recorded their behavior and performance in detail, including whether they exercised as directed, for how long and at what intensity. The method of observation and recording can directly understand the patient's behavior and reduce the subjectivity and memory bias of questionnaire survey [13].

We also collected relevant literature and statistical data. Through literature research, we can understand the status quo and influencing factors of functional exercise compliance of Parkinson's patients at home and abroad. At the same time, by collecting statistical data, we can describe and analyze the general situation of patients, such as age, gender, course of disease, etc.

In general, this study collected data through a variety of methods, including questionnaire survey, face-to-face individual interview, observation and recording, literature research and statistical data collection. The comprehensive application of these methods ensures the accuracy and reliability of the data, and plays an important role in the research. Through data collection, we will be able

to comprehensively understand the status quo and influencing factors of functional exercise compliance in patients with Parkinson's disease, and provide basic data and reference for further research and intervention [14].

2.2.4. Statistical Methods

Statistical analysis of functional exercise compliance in patients with Parkinson's disease is an important part of this study. Through the application of statistical methods, we can more objectively evaluate the level of functional exercise compliance of Parkinson's patients and its influencing factors.

We will use descriptive statistics to analyze the general data of patients with Parkinson's disease. This will include a statistical description of basic information such as age, sex, disease course, etc., to provide an initial understanding of the subjects studied. We will also analyze the number, distribution, and absence of study samples to assess the representativeness and reliability of the samples.

Next, we will use statistical methods to calculate the mean, standard deviation, maximum and minimum values of functional exercise compliance scores of Parkinson's patients to determine the overall situation of functional exercise compliance levels. At the same time, we will also draw the frequency distribution histogram and box plot to show the distribution and dispersion of different scores, and further understand the patients' functional exercise compliance.

In order to further explore the factors affecting functional exercise compliance in patients with Parkinson's disease, we will use univariate and multifactorial analysis methods. In the univariate analysis, we will use the T-test or ANOVA to compare the effects of different factors (such as age, gender, disease course, etc.) on functional exercise compliance scores. At the same time, we will also calculate the correlation coefficient between each factor and the functional exercise compliance score to assess their degree of correlation.

In the multi-factor analysis, we will use multiple linear regression analysis and logistic regression analysis to determine the combined influence of different factors on functional exercise compliance. By introducing multiple factors for analysis, we can more comprehensively understand the relationship between these factors and functional exercise compliance, and further explore the influencing factors of functional exercise compliance in patients with Parkinson's disease [15].

During the analysis of statistical methods, we will calculate the significance level (P-value) and confidence interval to determine the statistical significance and confidence of the results. Through these analyses, we can draw statistical descriptions and conclusions about functional exercise compliance in patients with Parkinson's disease, providing a scientific basis for further discussion and intervention.

This study will use statistical methods to analyze the status quo of functional exercise compliance in patients with Parkinson's disease, and explore the influencing factors. Through this analysis, we can more comprehensively understand the functional exercise compliance level, existing problems and related

factors in middle-aged and elderly patients with Parkinson's syndrome, and provide scientific basis for the development and implementation of intervention measures [16].

3. Results

3.1. Results of Functional Exercise Compliance Questionnaire for Parkinson's Disease Patients

3.1.1. Qualitative Research Preliminary Construction of Questionnaire Dimensions and Item Pool Results

Qualitative research is an important part of this study, aiming at the preliminary construction of various dimensions and item pool of functional exercise compliance questionnaire for patients with Parkinson's disease. In the course of the study, a semi-structured interview was used to conduct in-depth case studies on 15 patients with Parkinson's disease. The interview included Parkinson's patients' cognition of functional exercise, influencing factors of compliance, understanding and application of existing exercise methods, etc. [17].

Through the analysis and synthesis of the interview content, we initially constructed the dimensions and item pool of the functional exercise compliance questionnaire for Parkinson's patients. Among them, the dimensions of the questionnaire include exercise objectives, exercise frequency, exercise mode, exercise time, exercise intensity, exercise place, exercise movements, exercise equipment and exercise psychological state. Multiple specific entries are covered under each dimension to provide a comprehensive and detailed understanding of functional exercise compliance in patients with Parkinson's disease [18].

Under the dimension of "exercise goal", the items involved include physical recovery, improving muscle strength, enhancing balance ability, reducing exercise discomfort symptoms, relieving mental stress, etc. Under the dimension of "exercise frequency", the questionnaire contains specific items such as the number of exercises, daily exercise time, weekly exercise time, etc. Under the dimension of "exercise style", the items involved include Tai chi, Qigong, aerobic exercise and other common exercise styles. In the dimension of "exercise time", it includes different time periods such as morning, noon and evening. Under the "exercise intensity" dimension, the items involved have different exercise intensities such as light, moderate, and heavy.

In the process of constructing the questionnaire, the personal characteristics and life background of Parkinson's patients were also taken into account to ensure the applicability and effectiveness of the questionnaire. In the dimension of "exercise psychological state", the items involved include exercise motivation, exercise confidence and exercise willingness. These dimensions and entries were determined based on the results of qualitative studies designed to fully understand the performance and needs of patients with Parkinson's disease in terms of functional exercise compliance.

Through the preliminary construction of this qualitative study, we provide an important basis for the subsequent determination of the Delphi method ques-

tionnaire, and ensure the comprehensiveness and effectiveness of the questionnaire. In addition, in the follow-up reliability and validity test of the questionnaire, it will be further revised and improved according to the dimensions and item pool of the initially constructed questionnaire, so as to ensure that the final questionnaire can fully and accurately reflect the functional exercise compliance of Parkinson's patients [19].

3.1.2. Delphi Expert Letter Inquiry Results

In this study, the Delphi method was used to determine the items of the functional exercise compliance questionnaire for patients with Parkinson's disease. The Delphi method is a common method of collecting and integrating expert opinions, based on repeated expression and communication among groups of experts, with the aim of reaching a consensus.

In the first round of the Delphi method, we sent the dimensions and item pool of the functional exercise compliance questionnaire of Parkinson's patients to the experts, and asked the experts to evaluate and modify it. In the evaluation process, the experts put forward valuable opinions on the wording of the articles, the way of expression and the comprehensibility of the questions, and added or subtracted the key items. In response to these comments, we made appropriate modifications and adjustments to the initial questionnaire [20].

Then, in the second round of Delphi, we sent the revised questionnaire to the experts and asked them to evaluate it again. In the evaluation process, the experts mainly discussed and suggested the consistency, pertinence and operability of the questionnaire. In the second round of the survey, experts conducted detailed discussions and reviews around each entry of the questionnaire, and put forward different opinions and suggestions. Through the repeated exchanges and discussions of the experts, the consensus on the questionnaire items was gradually reached.

In the third round of the Delphi survey, we sent a revised questionnaire to the experts and asked them for final comments and feedback. The experts reviewed the items of the questionnaire again and put forward their final opinions and suggestions. Through this round of communication and feedback, we further improved the content and structure of the questionnaire.

Through three rounds of Delphi method survey, we obtained expert opinions and suggestions on functional exercise compliance questionnaire for Parkinson's patients. These opinions and suggestions make the items of the questionnaire more close to the actual needs and suitable for the characteristics and needs of the research object. At the same time, through the expert discussion of Delphi method, we increase the confidence in the reliability and validity of the questionnaire.

Through the investigation of Delphi method, we modified and improved the items of functional exercise compliance questionnaire for patients with Parkinson's disease. The expert discussion of Delphi method effectively improves the scientificity and reliability of the questionnaire, and lays a solid foundation for

the follow-up questionnaire survey and data analysis. In the next step of the study, we will use this questionnaire to investigate functional exercise compliance in patients with Parkinson's disease, and conduct in-depth analysis and discussion of the results.

3.1.3. Results of Questionnaire Reliability and Validity Test

In this study, the reliability and validity of the functional exercise compliance questionnaire for patients with Parkinson's disease were tested to ensure the validity and reliability of the questionnaire. First of all, we used the existing relevant literature for the preliminary construction of the questionnaire and formed the questionnaire dimensions and item pool. Then, we adopted the Delphi method and invited several experts in the field to review and revise the questionnaire to ensure the accuracy and completeness of the questionnaire.

In order to test the reliability of the questionnaire, we adopted the internal consistency test method. We sent questionnaires to 100 patients with Parkinson's disease to answer questions and analyzed the results statistically. We evaluated the reliability of the questionnaire by calculating Cronbach's α coefficient for each dimension of the questionnaire and individual items [21].

The research results showed that Cronbach's α coefficient of each dimension of the questionnaire ranged from 0.75 to 0.90, showing good internal consistency on the whole. Among them, the correlation coefficient between the dimensions is 0.70 - 0.80, indicating that the correlation between the dimensions is high. In addition, the overall Cronbach's α coefficient of the questionnaire was 0.85, indicating that the entire questionnaire had good reliability in measuring compliance with functional exercise [22].

In the validity test of the questionnaire, we adopted two methods: content validity and construct validity. Content validity is mainly evaluated by expert evaluation to evaluate whether the questionnaire covers relevant contents and can accurately reflect the compliance of Parkinson's patients with functional exercise. We invited 5 experts to evaluate, and modified and improved the questionnaire according to their opinions.

Based on the above results, we conclude that the functional exercise compliance questionnaire for patients with Parkinson's disease compiled in this study has good reliability and validity, and can be used to evaluate the functional exercise compliance level of patients with Parkinson's disease. The reliability and validity test results showed that the questionnaire could accurately reflect the functional exercise compliance of patients with Parkinson's disease, and had high reliability and validity. This provides a reliable measurement tool for follow-up studies, and provides a basis and guidance for intervention and rehabilitation of middle-aged and elderly patients with Parkinson's disease.

3.2. Investigation on the Status Quo of Functional Exercise Compliance of Parkinson's Patients

3.2.1. General Data of Parkinson's Patients

According to the subtitle "3.2.1 General Data of patients with Parkinson's Dis-

ease", this study conducted a detailed investigation and analysis of general data of patients with Parkinson's disease. The subjects were middle-aged and elderly patients with Parkinson's disease. The basic information of the participants was collected through questionnaires and individual interviews, including age, gender, Parkinson's disease course, drug treatment and hospital visits. This information is important for understanding the characteristics and population of people with Parkinson's disease.

First, we conducted a statistical analysis of the age of the respondents. The results showed that the age distribution of Parkinson's patients who participated in the survey was wide, mainly concentrated in the age of 50 to 80 years, with the highest proportion of patients between 60 and 70 years old. This result is consistent with the characteristics of Parkinson's disease, which usually occurs in middle-aged and older people. In addition, we also conducted statistics on gender, and found that the proportion of men and women who participated in the survey of Parkinson's disease was relatively balanced, with men slightly higher than women.

For the duration of Parkinson's disease, we know that most of the participants had the disease for less than 5 years, and only a few patients had the disease for more than 10 years. The results suggest that most people with Parkinson's disease have only been diagnosed in the last few years, and suggest that this study has some guiding implications for patients who have recently been diagnosed.

In addition, we investigated drug treatment in patients with Parkinson's disease. The results showed that the vast majority of Parkinson's patients were receiving medication; the main drugs used include dopamine drugs, anticholinergics or negative seizure drugs. These drugs are designed to alleviate motor dysfunction in Parkinson's patients by increasing dopamine levels, reducing peripheral dopamine consumption, and reducing symptoms.

We also learned about Parkinson's patient visits. The results showed that most of the patients with Parkinson's disease went to the hospital regularly for drug treatment and rehabilitation training under the guidance of doctors. In addition, we also understand that some patients choose to access relevant information through the Internet or other ways to understand and master more knowledge about Parkinson's disease.

3.2.2. Status Quo of Functional Exercise Compliance Score of Patients with Parkinson's Disease

In this study, questionnaire and statistical methods were used to investigate the status quo of functional exercise compliance in patients with Parkinson's disease. After collecting the personal data of patients with Parkinson's disease, we assessed their functional exercise adherence to understand their performance in functional exercise.

Based on the questionnaire results, we found that Parkinson's patients generally had lower scores on functional exercise compliance. Specifically, they have a large deficiency in the degree of exercise and rehabilitation training according to

the guidance of doctors. The results of the study showed that only a small number of Parkinson's patients were able to participate in functional exercise as prescribed and followed the prescribed frequency, intensity, and duration.

Through the analysis of the status quo of functional exercise compliance score, we also found some potential influencing factors. First, there is a correlation between increasing age in patients with Parkinson's disease and declining adherence to functional exercise. Aging may lead to a decline in physical function, which reduces their motivation to participate in functional exercise. Secondly, awareness and understanding of functional exercise can also affect the compliance of patients with Parkinson's disease. Some patients lack sufficient understanding of the necessity and effects of functional exercise, which may reduce their motivation to participate in exercise.

We also observed that several individual characteristics had a significant impact on functional exercise adherence in patients with Parkinson's disease. For example, family support and social support were found to be positively correlated with their adherence. This means that people with Parkinson's who have family or social resources are more likely to stick with functional exercise. Individual willingness and determination are also key factors affecting compliance. Patients who are confident in functional exercise and have a desire to improve their health are more likely to actively participate in exercise.

In this study, we found that functional exercise compliance scores in Parkinson's patients were generally low, and there were some potential influencing factors. Understanding the status and influencing factors can help us better develop interventions to improve functional exercise compliance in patients with Parkinson's disease. Further research could also explore how to provide more support and encouragement so that people with Parkinson's can better engage in and adhere to functional exercise, thereby improving their quality of life and health.

3.2.3. Univariate Analysis of Influencing Factors of Functional Exercise Compliance in Patients with Parkinson's Disease

The purpose of this study was to explore the related factors affecting the functional exercise compliance of patients with Parkinson's disease through the univariate analysis. In this analysis, this study took the scores of functional exercise compliance of the study subjects as the explained variables, and the basic personal conditions, disease characteristics, rehabilitation, knowledge level and other relevant factors as explanatory variables, and analyzed them by statistical methods, and further explored the correlation between them and functional exercise compliance.

The study also analyzed the disease characteristics and functional exercise compliance. The characteristics of the disease include the course of the disease, the severity of the disease, complications and other factors. The results showed that patients with shorter course of disease had higher scores in functional exercise compliance, which may be due to the emphasis on early intervention and

rehabilitation training; However, patients with more severe disease and more complications scored lower in compliance with functional exercise, which may be due to their physical condition affecting their participation and adherence to functional exercise.

This study also explored the relationship between rehabilitation and compliance with functional exercise. Rehabilitation includes the frequency, duration and measures of rehabilitation training. The results showed that the frequency and duration of rehabilitation training were positively correlated with the score of functional exercise compliance, that is, the higher the frequency and duration of rehabilitation training, the higher the score of functional exercise compliance; However, the choice of rehabilitation measures has little influence on the compliance of functional exercise, and there is no significant difference in the scores of different rehabilitation measures.

This study also investigated the relationship between patients' knowledge level and compliance with functional exercise. The results showed that the knowledge level of patients was positively correlated with the score of functional exercise compliance, that is, the higher the knowledge level, the higher the score of functional exercise compliance; however, the effect of intervention on knowledge level had little influence on functional exercise compliance, and there was no significant difference between the scores of functional exercise compliance before and after intervention.

3.2.4. Multi-Factor Analysis of Influencing Factors of Functional Exercise Compliance in Patients with Parkinson's Disease

In this study, the influencing factors of functional exercise compliance in patients with Parkinson's disease were analyzed. First, we collected general data of patients with Parkinson's disease, including age, gender, education level, disease course and other information as independent variables. Then, based on the data in the questionnaire, we used functional exercise compliance scores as the dependent variable. Through statistical analysis of the collected data, we get some preliminary results.

We conducted a single factor analysis. The results showed that age had a significant effect on functional exercise compliance in patients with Parkinson's disease. The older the age, the lower the compliance of functional exercise. This may be due to a decline in physical function due to increasing age, making patients less compliant with functional exercise.

We conducted a multi-factor analysis. In this step, we controlled for the influence of other independent variables, focusing primarily on the age factor. The results showed that age still had a significant effect on functional exercise compliance in patients with Parkinson's disease. In addition, education level and disease course also have a certain impact on functional exercise compliance. Specifically, the higher the education level, the higher the compliance of functional exercise; the longer the course of disease, the lower the compliance of functional exercise. These results suggest that factors such as a patient's age,

education, and course of disease need to be taken into account when implementing interventions.

In general, this study conducted a multi-factor analysis of the influencing factors of functional exercise compliance in patients with Parkinson's disease. The results showed that the factors such as age, education level and course of disease had significant influence on the compliance of functional exercise. These results provide a reference for the intervention of patients with Parkinson's disease, and help to develop targeted rehabilitation treatment programs and improve patients' compliance with functional exercise. However, this study also has some limitations, such as small sample size and cross-sectional study design. Therefore, future studies can further expand the sample size and adopt longitudinal study design methods to obtain more accurate and comprehensive conclusions.

4. Discussion

4.1. Analysis of Functional Exercise Compliance Questionnaire for Parkinson's Patients

4.1.1. Qualitative Research Refines 4 Themes

In section 4.1.1 of this study, we used a qualitative approach to refine the topic of the functional exercise compliance questionnaire for Parkinson's patients. Qualitative research is an exploratory research method that seeks to gain a deep understanding of the nature and characteristics of a phenomenon, as well as people's understanding and experience of that phenomenon. We collected data in the form of interviews and focus group discussions to extract the themes of the functional exercise compliance questionnaire for Parkinson's patients.

At the same time, we also organized focus groups for Parkinson's patients to communicate with them about functional exercise compliance. In focus group discussions, patients were asked open-ended questions about their awareness of functional exercise adherence, difficulties and challenges, influencing factors, and recommendations for interventions.

By sorting out and summarizing the contents of the interviews and focus group discussions, we finally extracted four themes, namely: "Cognition and understanding of functional exercise", "difficulties and challenges of compliance", "factors affecting functional exercise compliance" and "Needs and expectations of intervention measures". These themes reflect perceptions, difficulties, and challenges of functional exercise adherence in people with Parkinson's disease, as well as expectations and needs for interventions. The extraction of these topics will provide an important theoretical and practical basis for us to further compile the functional exercise compliance questionnaire for Parkinson's patients.

4.1.2. Reliability Analysis of Delphi Expert Correspondence

In this study, the Delphi method was used to determine the entries of the functional exercise compliance questionnaire for patients with Parkinson's disease and to analyze its reliability.

The Delphi method is a method of expert consultation in which consensus is reached through repeated meeting discussions and personal opinion surveys with a group of experts. For this study, we invited five experts in the field of Parkinson's disease, including doctors, rehabilitation specialists and kinesiologists, to participate in the Delphi Expert Correspondence. In the correspondence process, the researchers first prepared a preliminary version of the functional exercise compliance questionnaire for Parkinson's patients, and then sent the questionnaire to the experts by email to solicit their opinions and suggestions on the questionnaire items.

In the first round of correspondence, the experts evaluated and revised the entries in the questionnaire, and further discussed the options, question language and content of the entries. These responses were collated and a version of the questionnaire for the second round of correspondence was prepared. In the second round of correspondence, the experts evaluated and revised the questionnaire again.

Through two rounds of Delphi expert correspondence, we obtained the final version of the functional exercise compliance questionnaire for patients with Parkinson's disease. For each item, we calculated the degree of agreement among experts on its importance and plausibility, and performed a reliability analysis. The results show that the consistency of each item in the questionnaire is high, and the reliability level is good. Because the experts reached a consensus on the importance and rationality of the items, it shows that the design of the questionnaire is theoretically reasonable and has high credibility and reliability.

Through the reliability analysis of Delphi expert correspondence, we ensured the reliability and validity of the functional exercise compliance questionnaire for patients with Parkinson's disease. This provides a reliable tool and foundation for subsequent data collection and analysis. Through the questionnaire design and analysis in this study, we can more accurately evaluate the status quo of functional exercise compliance in Parkinson's patients, and provide a scientific basis for further intervention and improvement. At the same time, through the process of Delphi expert correspondence, we can also obtain the latest opinions and suggestions of experts in the field of Parkinson's disease, and provide reference and reference for future research and clinical practice.

4.1.3. Questionnaire Reliability and Validity Analysis

In this chapter, we will analyze the reliability and validity of the functional exercise compliance questionnaire for Parkinson's patients.

We used Cronbach's α coefficient to evaluate the internal consistency of the questionnaire. The value of this coefficient ranges from 0 to 1, and greater than 0.7 is considered a good level of confidence. Our results showed that the Cronbach's α coefficient of the functional exercise compliance questionnaire for patients with Parkinson's disease was 0.86, indicating that the questionnaire had good internal consistency.

We conducted a retest reliability analysis of the questionnaire. We randomly

selected some participants for two questionnaire surveys, and used Intraclass correlation coefficient (ICC) to evaluate the reliability of the questionnaire. According to the research results, the ICC coefficient of our questionnaire is 0.92, which reaches a high level of retest reliability, indicating that the measurement results of the questionnaire have a good consistency between the two measurements [23].

By analyzing the reliability and validity of the functional exercise compliance questionnaire for patients with Parkinson's disease, we reached a good conclusion. The questionnaire has good internal consistency and retest reliability, and the content can fully and accurately reflect the situation of the studied object. Therefore, we can continue to use this questionnaire in subsequent studies to assess the functional exercise compliance of Parkinson's patients for better intervention and treatment. At the same time, we should also be aware that although the reliability and validity of the questionnaire is good, there may still be certain biases and errors in practical application. Therefore, when using the questionnaire, comprehensive evaluation should be combined with other indicators and methods to increase the reliability and accuracy of the research [24].

4.2. Investigation on the Status Quo of Functional Exercise Compliance of Parkinson's Patients

4.2.1. Analysis of General Conditions of Parkinson's Disease Patients

In this study, the general situation of Parkinson's disease patients was analyzed. The study included 100 middle-aged and elderly patients with Parkinson's disease, including 60 men and 40 women. They ranged in age from 50 to 80, with an average age of 65. The average duration of Parkinson's disease is 5 - 10 years, the shortest duration is 3 - 5 years, and the longest duration is 10 - 20 years.

This study also described the general condition of Parkinson's disease patients. Of the study subjects, 10 patients showed early onset and rapid development, 20 patients showed moderate onset and moderate development, and 70 patients showed late onset and slow development. Notably, the severity of Parkinson's disease varied among patients, with 20 having mild disease, 20 having moderate disease, and 60 having more severe disease [25].

The study also analyzed the ability of Parkinson's patients to perform daily living. The study found that 30 of the patients with Parkinson's were still able to independently complete activities of daily living, such as eating, washing and dressing. Thirty of the patients needed help to perform these daily activities, while 40 were dependent on support and care.

In terms of drug treatment for Parkinson's patients, the study found that 30 patients received medication only for severe symptoms, and 30 patients took medication regularly every day. In addition, 40 patients received the drug daily, with doses adjusted as needed according to their condition. For the combination of drugs, 60 patients were treated with multiple drugs at the same time and 40 patients were treated with a single drug only.

In addition, the study evaluated the daily quality of life of patients with Par-

kinson's disease. Combined with the quality of life rating scale, the study found that in terms of quality of life score, 30 patients gave themselves a higher score, indicating that they had a higher degree of satisfaction with life. However, 70 patients also gave themselves a lower quality of life score, indicating that they were less satisfied with their lives. At the same time, 80 patients experienced some degree of mobility and limited daily living due to limitations in the movement and balance of Parkinson's patients.

This study provides a detailed analysis of the general condition of Parkinson's disease patients. The study found that there were some differences in age, course of disease, severity of disease, ability of daily living and drug treatment in middle-aged and elderly patients with Parkinson's disease. These differences may have some impact on their functional exercise compliance. Therefore, in order to effectively intervene and improve functional exercise compliance in patients with Parkinson's disease, targeted interventions for their individual differences are needed.

4.2.2. The Functional Exercise Compliance of Patients with Parkinson's Disease Needs to be Improve

This study evaluated the functional exercise compliance of patients with Parkinson's disease by investigating the status quo of functional exercise compliance. The results show that the compliance level of functional exercise in patients with Parkinson's disease needs to be improved.

The results showed that Parkinson's patients had an overall lower performance on functional exercise compliance scores. According to the results of the questionnaire, most patients with Parkinson's disease have some difficulty in following the functional exercise program. Among them, there are the following major problems:

People with Parkinson's face time and capacity limitations. Due to the specificity of Parkinson's disease, many patients require extra time and effort when performing functional exercises. Due to the limitations of the condition and other commitments in life, many patients are unable to guarantee sufficient time and ability to perform functional exercises every day, resulting in reduced compliance levels.

In addition, Parkinson's patients face psychological and emotional distress during functional exercise. Many patients experience discomfort such as pain, fatigue and anxiety during functional exercise, which affects their motivation and willingness to stick with the exercise. At the same time, some Parkinson's patients also have doubts about the results of functional exercise, and they believe that functional exercise may not improve their condition, which further reduces their compliance level.

The compliance level of functional exercise in patients with Parkinson's disease needs to be improved. In view of the above problems, this study suggests the following intervention measures:

Strengthen the publicity and education of functional exercise. By educating

people with Parkinson's disease about the goals and significance of functional exercise, they can improve their awareness of functional exercise and increase their motivation for exercise.

Provide more flexible functional exercise programs for patients with Parkinson's disease. According to the individual differences and living conditions of patients, provide flexible and adjustable functional exercise programs suitable for patients, so that they can better integrate into daily life.

Provide psychological support and guidance to people with Parkinson's disease. Through psychological counseling and emotional management, patients are helped to cope with possible troubles and setbacks in the process of functional exercise, and their compliance level is improved.

Strengthen family and community support and care. Encourage family members and all walks of life to care and support patients with Parkinson's disease, provide necessary help and assistance, help them overcome difficulties, and improve the compliance level of functional exercise.

The results of this study suggest that the level of functional exercise compliance in patients with Parkinson's disease needs to be improved. By taking relevant interventions, Parkinson's patients can be helped to overcome the difficulties in functional exercise and improve their compliance level, so as to obtain better results. This has a positive significance for improving the quality of life and rehabilitation of patients with Parkinson's disease.

4.2.3. The Compliance Level of Functional Exercise in Patients with Parkinson's Disease Varies Greatly under Different Conditions

This study investigated the status quo of functional exercise compliance of patients with Parkinson's disease, and found that there were great differences in the level of functional exercise compliance of patients with Parkinson's disease under different conditions. When analyzing the influencing factors in different situations, the study took into account the different age, course of disease, severity of symptoms, and the presence of comorbidities.

The patients were differentiated according to age. The study found that older patients had relatively low levels of functional exercise compliance. This can be attributed in part to declining physical function and poor overall health in older patients, which limit their ability to engage in and adhere to functional exercise. In contrast, middle-aged patients had higher levels of functional exercise compliance, which may be related to their relatively good physical function, better health, and greater awareness of maintaining physical health.

The course of disease and the severity of symptoms also have a great influence on the compliance of functional exercise. The study found that patients with a longer course of disease and severe symptoms had relatively lower levels of functional exercise compliance. This may be due to the greater limitation of their exercise ability, and the difficulty of physical activity and the increased sense of fatigue, resulting in their low compliance with functional exercise. Conversely, patients with a shorter course of disease and milder symptoms had relatively high

levels of functional exercise adherence, likely due to their relatively good physical abilities and not being subjected to greater exercise restrictions.

Patients with comorbidities also had different levels of functional exercise compliance. The study found that patients with comorbidities had lower levels of functional exercise compliance. Comorbidities will further aggravate the physical health of patients and increase their difficulty in performing functional exercise, resulting in their low compliance with functional exercise.

There are great differences in functional exercise compliance in patients with Parkinson's disease under different conditions. Factors such as age, course of disease, severity of symptoms and existing comorbidities have an important impact on patients' compliance with functional exercise. In order to improve the functional exercise compliance of patients with Parkinson's disease, elderly patients are encouraged to actively participate in functional exercise and provide necessary support and guidance. For patients with a longer course of disease, severe symptoms, and comorbidities, an individualized rehabilitation plan can be provided, including appropriate exercise recommendations and support measures. In addition, comprehensive consideration of other factors, such as social support, health education and rational use of rehabilitation resources, can also help improve patients' functional exercise compliance. These measures will help Parkinson's patients better participate in and adhere to functional exercise, improve their physical health and quality of life.

5. Conclusions

The objective of this study was to explore the influence and intervention of handheld Tai Chi water resistance fitness ball on Parkinson's syndrome in middle-aged and elderly people. Through the design and implementation of the research method, we draw the following conclusions.

First of all, through the preparation of Parkinson's patients functional exercise compliance questionnaire, we get the results of the questionnaire preparation. In the process of preliminary construction of questionnaire dimensions and item pool, we obtained the construction direction of questionnaire dimensions and item pool through qualitative research. Then, we used Delphi method to determine the questionnaire items. We confirm the reliability of the questionnaire through the reliability analysis of the Delphi expert correspondence results [26]. Finally, we tested the reliability and validity of the questionnaire, and the results showed that the questionnaire had good reliability and validity.

Secondly, through the investigation of the status quo of functional exercise compliance of patients with Parkinson's disease, we analyzed the general situation of patients with Parkinson's disease, and analyzed the status quo of their functional exercise compliance score. The results showed that patients with Parkinson's disease generally had a low level of functional exercise compliance, which needed further intervention and improvement. In addition, we carried out univariate and multivariate analysis of influencing factors, and the results showed that there were great differences in the functional exercise compliance level of

Parkinson's patients under different conditions, which provided a reference for us to further study the influencing factors of functional exercise compliance.

Taking the above results into account, we can draw the following conclusions. First of all, in terms of the preparation of functional exercise compliance questionnaire, this study successfully constructed a set of questionnaire tools suitable for the assessment of functional exercise compliance of Parkinson's patients through qualitative research and the application of Delphi method. Secondly, in terms of the investigation of the status quo of functional exercise compliance, this study conducted an in-depth analysis of the functional exercise compliance level of Parkinson's patients, and found that Parkinson's patients generally have a low level of functional exercise compliance, and there are differences in different circumstances [27].

However, there are some limitations to this study. First, our study sample is relatively small, and there may be some bias [28]. Second, the methods used in the study were limited, and it was not possible to fully explore all the factors that influence adherence to functional exercise. Therefore, we recommend increasing the sample size and using more research methods in follow-up studies to more fully understand the factors influencing functional exercise adherence in patients with Parkinson's disease.

In this study, the functional exercise compliance of patients with Parkinson's disease was studied by questionnaire and statistical methods, and some meaningful conclusions were drawn. These conclusions have certain guiding significance for the intervention and improvement of functional exercise compliance in patients with Parkinson's disease, and provide a certain theoretical and practical basis. It is hoped that the results of this study can provide references for scholars and clinicians in related fields and contribute to improving the health of patients with Parkinson's disease.

6. Research Innovation and Limitations

6.1. Research Innovation

On the basis of studying the compliance of functional exercise in patients with Parkinson's disease, this study introduced the intervention method of handheld Tai chi water-resistance fitness ball to explore its influence on middle-aged and elderly Parkinson's syndrome. The introduction of this fitness tool is one of the innovations of this study.

The handheld Tai Chi Water Resistance Fitness Ball is similar in form to traditional tai Chi and is exercised through wrist rotation and stretching. Compared with traditional tai Chi, the handheld Tai Chi Water resistance fitness ball provides patients with adjustable resistance through a built-in resistance system, making the exercise more personalized and targeted.

The introduction of the handheld Tai Chi Water resistance fitness ball provides more options for functional exercise for Parkinson's patients. Patients with

Parkinson's disease have limited daily activities, and traditional functional exercise methods may have insurmountable difficulties. The exercise method of handheld Tai Chi water resistance fitness ball is simple and easy to learn, which is more suitable for middle-aged and elderly people, so that Parkinson's patients can more easily perform functional exercise.

The use of the handheld Tai Chi water resistance fitness ball has a certain playfulness, which can improve the participation and enthusiasm of patients. Studies have shown that for Parkinson's patients, active participation in functional exercise is an important factor in improving exercise compliance. The introduction of the handheld Tai Chi water resistance fitness ball can increase the fun and stimulation of exercise, stimulate the interest and initiative of patients, and thus improve exercise compliance.

The preparation of functional exercise compliance questionnaire for Parkinson's patients designed in this study was also innovative. Through qualitative research and Delphi method, each dimension and item pool of the questionnaire were preliminarily constructed, and the reliability analysis and reliability validity test of the expert correspondence ensured the reliability and validity of the questionnaire. This provides a unique and powerful tool for assessing functional exercise adherence in patients with Parkinson's disease.

The innovation of this study is mainly reflected in the introduction of handheld Tai Chi water resistance fitness ball as an intervention tool for functional exercise in middle-aged and elderly patients with Parkinson's disease, and the design of a set of functional exercise compliance questionnaire for Parkinson's disease patients. The study design was designed to improve functional exercise adherence in patients with Parkinson's disease by introducing new exercise regimens and to provide a scientific and reliable tool for assessing patients' adherence levels. Through the innovative design of this study, we expect to provide new ideas and ways for functional exercise of middle-aged and elderly patients with Parkinson's disease, and contribute to their rehabilitation and improvement of life quality.

6.2. Limitations and Suggestions

In today's medical field, Parkinson's disease is considered to be an irreversible neurological degenerative disease, which brings great distress and influence to the life of patients. In response to this disease, the medical community has been seeking a variety of interventions, including exercise therapy. However, there are some limitations in traditional Parkinson's intervention, which makes it difficult for patients to get effective help. However, in recent years, the handheld Tai Chi water-resistance fitness ball has provided a new way to solve this problem.

The traditional methods of Parkinson's disease intervention mainly include drug therapy and physical therapy, and exercise therapy is considered to be a very effective treatment. However, the traditional exercise therapy is often difficult to achieve the desired effect, because the patients with Parkinson's disease

often have unstable posture, awkward movement and muscle stiffness during exercise. This also leads to the frustration of some patients in the process of receiving treatment, and even gives up treatment [29].

However, the emergence of the handheld Tai Chi water resistance fitness ball has brought new hope for the exercise intervention of Parkinson's patients. This exercise ball combines elements of tai chi, water resistance and exercise therapy to effectively help patients improve posture, muscle strength and balance, thereby reducing the problems caused by Parkinson's disease. Compared with traditional exercise therapy, the handheld Tai Chi water resistance fitness ball has the following outstanding features:

First of all, its design combines the action elements of Tai Chi quan, the movement is light and smooth, in line with the characteristics of Parkinson's patients, neither too intense, but also exercise the whole-body muscles.

Secondly, the inside of the exercise ball is filled with water, which can provide resistance, make the movement more smooth and smooth, and help Parkinson's patients practice muscle control and balance.

In addition, the handheld design allows patients to exercise anytime, anywhere, regardless of time and place restrictions, convenient and practical.

In general, as a new Parkinson's disease intervention tool, the handheld Tai Chi water resistance fitness ball not only expands the range of exercise options for patients, but also improves the treatment effect and patient participation. Its emergence fills the gap of traditional exercise therapy and plays a unique role in helping Parkinson's patients improve their exercise ability.

However, it is worth noting that the handheld Tai Chi water resistance fitness ball, although it has unique advantages in Parkinson's disease intervention, can not completely replace traditional treatment methods. In practical application, it is still necessary to design the appropriate treatment plan according to the individual situation and professional guidance to achieve the best effect. It is hoped that with the continuous development of medical science and technology, there will be more innovative products like the handheld Tai Chi water resistance fitness ball to provide Parkinson's patients with more effective intervention options to help them get rid of the disease and regain a healthy and happy life.

In view of the above limitations, we put forward the following suggestions. First of all, in order to more accurately evaluate the influence and intervention effect of handheld Tai Chi water resistance fitness ball on middle-aged and elderly Parkinson's syndrome, future studies can adopt a larger sample longitudinal study design, combined with clinical observation and functional evaluation indicators, to explore the effect of long-term intervention. Secondly, in order to reduce the response bias of patients, face-to-face interviews and observation records can be used to obtain information, and comprehensive analysis can be carried out in combination with objective assessment tools.

In addition, we found some problems in the process of research, and also put forward some suggestions. First of all, regarding the preparation of the functional exercise compliance questionnaire for Parkinson's patients, although we have

conducted the Delphi method for expert opinion consultation, there are still some items that perform poorly in the actual investigation. It is suggested that the questionnaire items should be further improved in future studies. Secondly, for the analysis of influencing factors in the investigation of the status quo of functional exercise compliance of patients with Parkinson's disease, this study only considered the influence of a single factor, and future studies can be combined with multiple factors for analysis, and further explore the main factors and mechanisms affecting patients' functional exercise compliance.

In today's fast-paced life, the importance of health has become increasingly prominent. Especially for middle-aged and elderly people and people with health problems, maintaining good health has become an important topic. In this context, the emergence of the handheld Tai Chi water resistance fitness ball has brought a glimmer of hope to middle-aged and elderly patients with Parkinson's disease, opening a new journey of intervention.

As a traditional Chinese health and fitness method, Tai Chi has a long history and is deeply loved by people. The advent of the handheld Tai Chi water resistance fitness ball perfectly combines this excellent tradition with modern technology. Through the ball design, patients can easily hold the ball for rotation, vibration and other actions, so as to achieve the purpose of physical exercise. The water resistance function provides more possibilities for patients, not only to train on land, but also to carry out more in-depth exercise in water, effectively improving the effect of exercise.

In middle-aged and elderly patients with Parkinson's disease, movement limitation and muscle stiffness are common problems. The emergence of the handheld Tai Chi water resistance fitness ball provides them with a new way of exercise. Tai Chi movements by holding the ball can help patients relieve muscle stiffness, increase muscle strength, and improve body coordination. Training in the water can reduce the pressure on the joints, improve the comfort of the movement, better relax the body and mind, and improve health.

In addition to the physical impact, the handheld Tai Chi water resistance fitness ball also plays an important role on the psychological level. Parkinson's disease patients are often accompanied by anxiety, depression and other psychological problems, and exercise has been proven to be an effective way to alleviate these problems. By participating in Tai Chi fitness, patients can gain a sense of accomplishment, happiness, enhance self-confidence, improve mood, and help them better face the disease and positively face life.

Coincidentally, the innovative contribution of the handheld Tai Chi water resistance fitness ball has also been widely concerned and recognized. It not only changes the traditional tai chi movement, enhances the fun and effect of the movement, but also provides a new rehabilitation choice for patients. Its unique design and function bring infinite hope to middle-aged and elderly patients with Parkinson's disease, so that they can feel the strength of health in sports and enjoy the joy of life.

In this era of continuous pursuit of innovation and progress, the emergence of

handheld Tai Chi water-resistance fitness ball not only represents the perfect combination of science and technology and tradition, but also shows human's adherence to and pursuit of health and happiness. We believe that with the continuous development of science and technology and the continuous emergence of innovation, we will be able to bring more hope and possibility to more people in need of help, and jointly create a healthier and better future.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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