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Virtual Reality Intelligent Medical Experiment Combined with Liuwei Dihuang Pills Repairing Effect on Male Reproductive System Injury

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Abstract: Liuwei Dihuang Wan is a kidney-tonify Chinese medicine that has been tested and promoted by the State Administration of Traditional Chinese Medicine. A large number of studies have shown that Liuwei Dihuang Wan does have certain nourishing and therapeutic effects on male kidney yin loss. However, the invention of Liuwei Dihuang Pills originated from the records of ancient medical books and the research and improvement of predecessors. It is an over-the-counter drug with some adverse reactions and unclear drug contraindications. Therefore, it is difficult to use traditional medical methods to study whether Liuwei Dihuang Wan has a repair effect on male reproductive system damage. The purpose of this article is to jointly analyze the repairing effects of Liuwei Dihuang Pills on male reproductive system damage through intelligent medical experiments based on virtual reality. First of all, this article understands the drug characteristics and main symptoms of Liuwei Dihuang Wan through literature research and consultation with experienced Chinese medicine practitioners. Then, this article understands the main technical principles of virtual reality intelligence and its application in medical experiments. Then, according to the application research of virtual reality intelligence in medical experiments, under the guidance of professionals, a medical experiment based on virtual reality intelligence is drawn up to jointly study the effect of Liuwei Dihuang Wan on the repair of male reproductive system damage. The results show that at the 95% confidence level, this experiment is 93.74% confident that Liuwei Dihuang Wan has a certain repair effect on male reproductive system damage.

1. Introduction

1.1. Background and Significance

With the improvement of medical level and the development of computer technology, more and

more computer technology is applied in the medical field. Virtual reality technology is one of the most popular computer application technologies, and it has important applications in the medical field. For example, long-range medical treatment, intelligent online diagnosis, etc. all refer to or borrow some principles of virtual reality technology[1]. However, most of the applications of virtual reality technology in the medical field stay in the general direction of strategic applications, and the application of specific disease medical experiments is not deep. At present, due to long-term bad diet and living habits, as well as some genetic diseases or complications, the treatment of reproductive system damage diseases is not rich, especially the repair and treatment of male reproductive system damage is single[2]. Liuwei Dihuang Pill is a common drug treatment method for male reproductive system injury diseases with kidney yin loss, but because it is an over-the-counter traditional Chinese medicine and its adverse reactions are unknown, its clinical trials are not rigorous[3]. Traditional reproductive system injury repair medical experiments mainly analyze and judge the treatment effect through the patient's symptoms and semen conditions. Because it involves patient privacy and it is difficult to observe the effects of drug treatment for a long time, there are great limitations[4]. Virtual reality technology has opened up new horizons to solve this problem. It not only meets the need for real-time observation of the effects of drugs, but also avoids the inconvenience of experimental observation caused by the leakage of patient privacy. It is of great significance for studying the repairing effect of Liuwei Dihuang Pills on male reproductive system damage.

1.2. Related Research at Home and Abroad

At present, there are a lot of researches on the application of virtual reality intelligence in various fields at home and abroad, and its application in the field of intelligent medical treatment is also highly valued. Park uses virtual reality technology for forensic teaching in a virtual teaching system based on forensic evidence[5]. Gallagher evaluates the impact of innovative virtual reality learning environment on the development of students' technical level through the role-playing of students in the virtual reality environment to evaluate their clinical skills[6]. Experiments have shown that, compared with the total role-playing skill scores simulated by the traditional laboratory, the total role-playing skills scores of students who use VR software simulation training are higher. Vegas discussed the demonstration of practical technology and wearable devices at the annual university conference in Las Vegas, and tested the development version of the augmented reality smart helmet in the expansion project of a medical center in Minneapolis[7]. The test found that the device is specifically designed for construction workers and industrial workers. It combines an augmented reality display running BIM 360 and an OSHA PPE certified safety helmet and protective glasses. Muse proposed to use a Cyber medical model called Cyber to advance and transform today’s medical systems. Doctors can consult with patients through video conferences on a distributed network, and patients can use long-range medical treatment and smart phones as well as wearable. Information technology such as sensors establishes contacts with tertiary medical experts in different areas[8]. Research shows that the Cyber medicine model uses long-range medical treatment and wearable sensors and smart phones to connect patients and experts, and transfer medical services from hospitals to homes, from experts to generalists, and from treatment to prevention, but the process of the simulation experiment is too complicated.

Domestically, there has also been an upsurge in the application of virtual reality intelligence in various fields, and a wealth of research results have been achieved. Huang HM discussed the process of using high-performance real-time interactive software to build a prototype 3D virtual

reality learning system, and studied the application of technologies such as human disease simulators, immersive virtual reality cave automatic virtual environment systems and video conferencing in medical education [9]. Experiments have shown that the immersion and imagination characteristics of VR mediated course content have a positive impact on the practicality of perception, and can also predict the ease of perception, which helps learners use the VR learning system's behavioral intentions. Yang S studied the surface finish control process of semiconductor material processing through virtual reality technology [10]. Experiments show that silicon germanium semiconductor is one of the best strain relaxation buffers on the advanced technology node of material processing. Appropriate DTPA-5K concentration control can ensure colloidal stability and improve the surface roughness of silicon germanium semiconductor. This article mainly discusses the repair process of male reproductive system damage, and there are many related studies. For example, Yan X conducted systematic reviews and meta-analysis through randomized controlled trials to explore the effects of physical exercise on the quality of semen and the reproductive system of male infertility[11]. Liu Y proposed to establish an experimental animal model that simulates human kidney disease to study whether the damage to the male reproductive system caused by renal tubules interstitial fibrosis is a reversible process, but the practicality of the research is not very high[12].

1.3. Innovations in This Article

This article aims to study the effect of Liuwei Dihuang Wan on the repair of male reproductive system damage. Compared with traditional medical research experiments, this article creatively uses virtual reality and artificial intelligence technology to combine drug treatment and experimental observation in reproductive system damage repair through intelligent sensor equipment and computer technology, in order to study the effect of Liuwei Dihuang Wan on the male reproductive system The damage repair function provides a reliable experimental environment and powerful research data [13]. From a theoretical perspective, medical experiments based on virtual reality intelligence abandon the experimental links of observation in the past stage, can accurately track and analyze the process of drugs from taking to taking effect, and more clearly reflect the mechanism and effects of drugs [14]. From a practical point of view, this article based on the virtual reality intelligent medical experiment combined with the study of the repair effect of Liuwei Dihuang Pills on male reproductive system damage is helpful to understand the role of these pharmaceutical ingredients to adjust the dosage and improve the composition of the drug [15]. Therefore, the virtual reality intelligent technology in this paper is of great significance for studying the repairing effect of male reproductive system damage and improving the treatment effect.

2. Application of Virtual Reality Technology in Intelligent Medical Experiment

2.1. Establishment of Intelligent Medical Knowledge Base

According to related research, this article has established an intelligent medical knowledge base to assist in the processing and analysis of various medical data in the process of medical experiments, and can also combine artificial intelligence technology for simple disease diagnosis. The intelligent medical knowledge base mainly includes the main types of data such as diseases, symptoms, age and gender [16-17]. These data can be classified and processed by prior probability. For example, the calculation formula of prior probability of a disease is as follows. $P(d_i)$ is the prior probability of disease i, $f(d_i)$ is the number of occurrences of the disease in the medical database

record, and m is a constant.

$$P(d_i) = \frac{f(d_i) + m}{\sum f(d_i) + m} \quad (1)$$

Similar to the calculation of prior probability of disease, symptoms also have a prior probability calculation method. Since symptoms often occur with disease in medicine, its prior probability is calculated on the basis of the prior probability of disease [18-19]. The priori probability calculation formula of symptoms is as follows, where $P(s_j \mid d_i)$ represents the probability that a patient has symptoms j when suffering from disease i, $f(s_j, d_i)$ represents the number of simultaneous occurrences of the above diseases and symptoms in medical database records, and λ is a constant.

$$P(s_j \mid d_i) = \frac{f(s_j, d_i) + \lambda}{\sum f(s_j, d_i) + \lambda} \quad (2)$$

In the medical field, due to gender differences, even though the same disease produces different symptoms and reactions in individuals of different genders, the medical knowledge base also needs to record the prior probability of the relationship between the disease and gender. Based on the prior probability and disease medical records, the intelligent system can quickly find cases corresponding to gender and disease and make preliminary judgments. The formula for calculating the prior probability of disease and sex is as follows.

$$P(g_j \mid d_i) = \frac{f(g_j, d_i) + \mu}{\sum f(g_j, d_i) + \mu} \quad (3)$$

The diagnosis and treatment of the disease are different for the patient's age. This article divides the corresponding relationship between the patient and the disease into different age groups and records it in the medical knowledge base according to the age of the patient. It is mainly divided into infants and toddlers born to under 2.5 years old, children aged 3 to 6 years old, teenagers aged 7 to 17, young people aged 18 to 40 years old, middle-aged 41 to 50 years old, middle-aged aged 51 to 65 and elderly over 66 years old. The calculation formula for the prior probability of disease and age group is as follows, where $P(a_j \mid d_i)$ represents the probability that patients in age group j suffer from disease i, $f(a_j, d_i)$ represents the number of occurrences in medical database records of patients in the above age group and disease type, and ν is a constant.

$$P(a_j \mid d_i) = \frac{f(a_j, d_i) + \nu}{\sum f(a_j, d_i) + \nu} \quad (4)$$

2.2. In-depth Image Analysis and Processing Algorithms

In the virtual reality intelligent medical experiment, the analysis and processing of images are mainly realized based on the principle of deep learning algorithm of artificial intelligence technology. Deep image analysis and processing are mainly divided into two major processes: intelligent recognition and image processing. Nowadays, the application and research of static image recognition and processing technology has been very mature, so this article mainly introduces the intelligent dynamic recognition algorithm in virtual reality. At present, dynamic recognition mainly includes recognition algorithms based on Hausdorff distance, recognition algorithms based on statistical models, and recognition algorithms based on joint points [20-21]. Assuming there are two point sets $A = (a_i \mid i = 1, \ldots, n)$ and $B = (b_i \mid i = 1, \ldots, n)$, their Hausdorff distance

calculation method is as follows. Where $\|a-b\|$ represents the distance norm from the point set A to the point set B, usually based on the Euclidean distance, and $h(A,B)$ is the Hausdorff directed distance between the two point sets.

$$\begin{cases} H(A,B) = \max[h(A,B), h(B,A)] \\ h(A,B) = \max\limits_{a\in A} \min\limits_{b\in B} \|a-b\|, h(B,A) = \max\limits_{b\in B} \min\limits_{a\in A} \|b-a\| \end{cases} \quad (5)$$

The Hausdorff distance describes the similarity between two point sets. The larger the Hausdorff distance, the lower the similarity between the two point sets and the greater the difference. According to the Hausdorff distance calculation of the point set, the following similarity criterion can be obtained. Among them, M is the three-dimensional image sequence of dynamic images collected by virtual reality after dimension reduction, M_i is the sequence to be recognized, and n is the number of three dimensional image sequences.

$$B = \arg\min(H(M, M_i)), i = 1,...,n \quad (6)$$

According to the characteristics of virtual reality images, this article mainly introduces the statistical model recognition algorithm based on the assumption of independence. In the statistical model recognition algorithm, the independence assumption is only related to the output state, which can be expressed as the following form. Among them, O is the dynamic image observation sequence, Q is the dynamic image state sequence, and T is the observation time.

$$P(o_i \mid q_i) = \prod_{t=1}^{T} P(o_t \mid q_t) \quad (7)$$

The image recognition process based on the statistical model recognition algorithm is based on the learning process and the estimation process of the output independence hypothesis, using discrete training data to train the model parameters, and then calculate the matching probability of the discrete image sequence to be recognized, and then select the highest matching probability As the final sequence of recognition. Its standard form of discrimination is shown below, where O is the discrete training image sequence, and λ_i is the state parameter of the initial model.

$$B = \arg\max P(O \mid \lambda_i) \quad (8)$$

The recognition algorithm based on joint points is mainly used for the recognition and tracking of human skeleton images. It is a process of identifying and recording the image sequence profile of the human skeleton through the positions of a series of key nodes, and performing three-dimensional reproduction. Similar to the Hausdorff distance recognition algorithm, the joint point recognition algorithm also recognizes the image sequence based on the Euclidean distance between the three-dimensional space coordinates of the human joint points. The calculation method of the Euclidean distance of the three-dimensional space coordinates of the human joint points is as follows.

$$D(x,y) = \sqrt{(x_1-y_1)^2 + (x_2-y_2)^2 + (x_3-y_3)^2} \quad (9)$$

In the joint point recognition algorithm, the recognition of the human body image sequence only needs to be determined by the Euclidean distance and the angle relationship in the three-dimensional space of the joint points. Through this recognition method, dynamic images of different human postures can be recognized, and this article does not need to study complex human postures, so only a few dynamic images under specific postures need to be recognized. According to

the law of cosines, the angle between the joint points can be calculated by the following formula. A, B, and C represent the three-dimensional space coordinates of the three joint points, a, b, and c represent the distance between the three sides of a plane triangle formed by the joint points, and θ represents the angle between the a side and the c side of the triangle.

$$\theta = \arccos\theta \frac{a^2 + b^2 - c^2}{2ac} = \arccos\theta \frac{D^2(B,C) + D^2(A,C) - D^2(A,B)}{2D(B,C)D(A,B)} \quad (10)$$

2.3. Drug Component Action Tracking and Monitoring

In the process of drug diffusion and action, the diffusion motion of each component is a continuous time image sequence, so they will be limited by the diffusion speed, and one or several components cannot be within the time interval of one frame. Diffusion too far distance [22-23]. Assuming that the time interval of every two frames in the image sequence collected in the experiment is t, and the spatial position coordinates of the drug component in the $m-1$ and m frames are $M(x_{a,m-1}, y_{a,m-1}, z_{a,m-1})$ and $M(x_{a,m}, y_{a,m}, z_{a,m})$, the diffusion speed of the drug component in the three-dimensional direction of the spatial coordinates can be obtained by the following formula Calculation.

$$\begin{cases} v_{ax,m} = (x_{a,m} - x_{a,m-1})/t \\ v_{ay,m} = (y_{a,m} - y_{a,m-1})/t \\ v_{az,m} = (z_{a,m} - z_{a,m-1})/t \end{cases} \quad (11)$$

According to the calculation of the diffusion and effective speed of the drug components, the drug can be tracked and predicted, so as to get the position of the drug in the human body at a certain time. However, since the drug will be consumed and decomposed during the action, and continuous monitoring of drug diffusion cannot be truly achieved, the reliability of the drug monitoring location at a certain time can be analyzed when tracking the diffusion and action location of the drug component. The formula for calculating the credibility of the drug tracking monitoring location is as follows, where (T_x, T_y, T_z) is the credibility of the three-dimensional space of the drug component diffusion location, and ϕ is the credibility test function.

$$T_x = \phi\left(\left|\frac{v_{ax,m} - v'_{ax,m}}{v_x}\right|\right), T_y = \phi\left(\left|\frac{v_{ay,m} - v'_{ay,m}}{v_y}\right|\right), T_z = \phi\left(\left|\frac{v_{az,m} - v'_{az,m}}{v_z}\right|\right), T = \sqrt{T_x^2 + T_y^2 + T_z^2} \quad (12)$$

2.4. Virtual Reality 3D Geometric Transformation

In the processing of virtual reality intelligent medical experiment data, three-dimensional geometric image transformation is mainly divided into translation transformation, rotation transformation and scale transformation [24-25]. According to the principles of linear algebra and three-dimensional matrix transformation, the three-dimensional translation transformation of a virtual reality image sequence can be expressed in the following form. Among them, dx, dy and dz represent the displacement of the image in the three directions of space coordinates.

$$P_t = \begin{bmatrix} x & y & z & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ dx & dy & dz & 1 \end{bmatrix} = \begin{bmatrix} x+dx & y+dy & z+dz & 1 \end{bmatrix} \quad (13)$$

Since the three-dimensional image coordinates are composed of x, y, and z coordinates, the most complicated geometric transformation of the virtual reality three-dimensional image is the rotation transformation. According to the principle of spatial analytical geometry and matrix three-dimensional transformation, it can be known that the projection relationship between the transformed coordinates and the original coordinates obtained by rotating the image around the x-axis by angle α is as follows.

$$x' = x, y' = y\cos\alpha - z\sin\alpha, z' = y\sin\alpha + z\cos\alpha \quad (14)$$

Rotating around a different coordinate axis or a certain line will result in completely different image transformation results. This article mainly introduces the transformation process of image rotation around the x-axis. Through projection calculation and matrix transformation, the form of the rotation transformation process of the virtual reality three-dimensional image rotated by angle α around the x axis can be obtained as follows.

$$P_x = \begin{bmatrix} x & y & z & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha & 0 \\ 0 & -\sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} x & y\cos\alpha - z\sin\alpha & y\sin\alpha + z\cos\alpha & 1 \end{bmatrix} \quad (15)$$

The scale transformation of a three-dimensional image is similar to the enlargement and reduction processing of a two-dimensional planar image, but it is slightly more complicated than the two-dimensional image transformation because it needs to consider multiple directional coordinates and also take into account the overall resolution and aesthetics of the three-dimensional image. This article takes the origin of the space coordinates of the virtual reality three-dimensional image as the center and carries out the transformation of the scales a, b and c along the three coordinate axis directions. The transformation process and the transformed coordinates are as follows.

$$P_m = \begin{bmatrix} x & y & z & 1 \end{bmatrix} \begin{bmatrix} a & 0 & 0 & 0 \\ 0 & b & 0 & 0 \\ 0 & 0 & c & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} ax & by & cz & 1 \end{bmatrix} \quad (16)$$

In virtual reality medical experiments, researchers need to manipulate virtual objects and perform three-dimensional transformations on images. At this time, different three-dimensional image sequences may collide. In order to ensure that the image is clear and realistic, this paper proposes the method of using bounding boxes to divide each 3D model into different spatial units, and then use the bounding box to display and link other 3D image sequences. Commonly used

bounding boxes are four types of bounding boxes, including ball BB, axial bounding box ABB, directional bounding box DBB, and discrete direction bounding box DDBB. This article compares the difficulty of construction, compactness, and three-dimensional transformation update speed. According to their characteristics, experiments are carried out by using axial bounding boxes with a fast update speed according to the comparison results and experimental requirements.

Table 1. Comparison of common bounding box characteristics

Bounding box	Tightness	Build difficulty	Rotation update speed
BB	Not close	Simple	No update
ABB	Closer	Simpler	Fast update
DBB	Close	More complicated	Slow update
DDBB	Close	Complex	Slow update

3. Intelligent Medical Experiment for Repairing Male Reproductive System Damage

3.1. Research Object

The experimental purpose of this study is to explore the repairing effect of Liuwei Dihuang Pills on male reproductive system damage. Therefore, the experimental subjects selected in this paper are several male mice of equivalent weight with no other diseases except the reproductive system. According to the related research of the reproductive system function, this article observes and evaluates the influence factors of the reproductive system function such as the growth and development of the testis, semen quality, the antioxidant function of the testis tissue, and the expression of testosterone synthesis-related genes in male mice through virtual reality intelligent experiments. Repair of reproductive system damage. Through virtual reality intelligence, some practical operations can be performed through virtual objects in the virtual reality laboratory, which not only avoids unnecessary harm to mice, but also makes the operation easier and more convenient. Under the premise of ensuring the reliability and accuracy of the experimental results, this paper can set up a real experimental control group and a virtual experimental group for comparative analysis.

3.2. Experimental Design of Liuwei Dihuang Pills to Repair Male Reproductive System Damage

The purpose of this research is to study the effect of Liuwei Dihuang Wan on the repair of male reproductive system damage through virtual reality intelligent medical experiments. The observation indexes before and after the test treatment mainly included male mice blood coagulation function, urine protein quantitative, plasma albumin ALB, triglyceride TG, cholesterol TC, urea nitrogen BUN. This experiment is mainly divided into the following steps. The first step is to understand the drug properties and principle of action of Liuwei Dihuang Pills through literature research and consultation with professionals, and to understand the research on the treatment of male reproductive system damage in the past. The second step is to build a virtual reality intelligent medical laboratory environment by consulting and seeking guidance from medical experts and authoritative persons in virtual reality intelligent medical experiments. The third step is to conduct research on the drug properties and effects of Liuwei Dihuang Pills in a virtual reality experimental

environment, and combine the real-life drug control treatments with Liuwei Dihuang Pills on male mice, comprehensive virtual detection and real experiments The research results discussed and analyzed the repairing effect of Liuwei Dihuang Pills on the reproductive system damage of male mice. The fourth step is to summarize relevant experimental data, and verify the accuracy of experimental conclusions through sample testing and reliability estimation. The main process of this research experiment is shown in Figure 1.

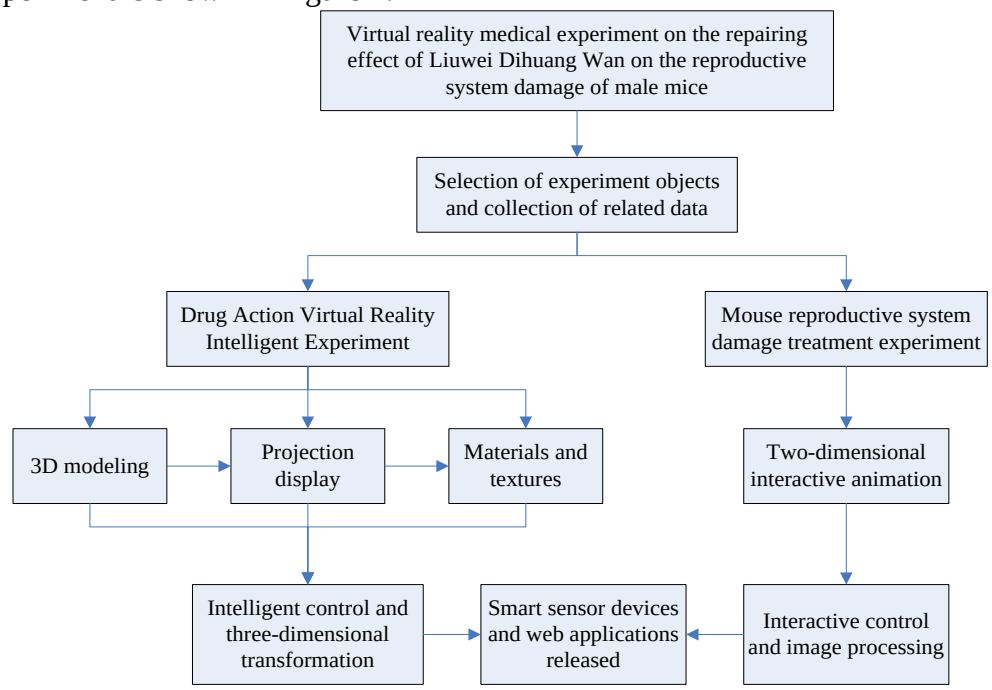

Figure 1. Virtual reality smart medical experiment on mouse reproductive system damage

3.3. Virtual Reality Experiment Data Processing and Reliability Estimation

In the process of treating male mice reproductive system damage through the virtual reality intelligent medical experiment combined with Liuwei Dihuang Pills, in order to accurately observe and analyze the effects of each component of Liuwei Dihuang Pills, it is necessary to use artificial intelligence technology for intelligent control. Taking the intelligent regulation of the relationship between disease and symptom in the intelligent medical knowledge base as an example, the distribution of the relationship between disease and symptom can be expressed as the following form. Among them, $P_1(s_i|d_j)$ and $P_2(s_i|d_j)$ respectively represent the distribution of different corresponding relations between diseases and symptoms, and ω represents the weight ratio between different distributions.

$$P(s_i|d_j)=\frac{\omega * P_1(s_i|d_j)+(1-\omega) * P_2(s_i|d_j)}{\sum \omega * P_1(s_i|d_j)+(1-\omega) * P_2(s_i|d_j)} \quad (17)$$

Because the drug components of Liuwei Dihuang Pills in mice continue to spread and change over time, it is necessary to repeatedly detect the distribution and action of drug components in mice within a certain time interval. Then, the data of the drug component effects obtained by the test are sample tested and reliability estimated. After verification, the experimental data can be used to analyze and evaluate the repair effect of Liuwei Dihuang Pills on mouse reproductive system

damage. The sample test is mainly divided into the calculation of the residual $u(t)$ of the experimental data and the frequency of small errors P. Their calculation formulas are as follows, where $x(t)$ and $\hat{x}(t)$ respectively represent the actual value and calculated value of the experimental data detected at time t.

$$u(t) = x(t) - \hat{x}(t), \bar{u}(t) = \frac{1}{n-1}\sum_{t=2}^{T} u(t), P = \left\{ \left| u(t) - \bar{u} \right| < 0.9374 * S_x \right\} \quad (18)$$

4. Discussion on Repairing Effect of Liuwei Dihuang Pills on Male Reproductive System Damage

4.1. Influence of Experiment Scene Complexity on Intelligent Control

The biggest difference between virtual reality smart medical experiment and traditional medical experiment is to avoid the loss of various equipment and complicated operation. As shown in Table 2, in the virtual experiment environment, the response time to non cross able obstacles such as walls and debris is the longest, and the interference to the intelligent control of the experiment is the largest. In addition, with the descending order of priority, the response time has also been extended.

Table 2. The impact of scene complexity on the intelligent control of virtual experiments

Obstacle	First	Second	Third	Fourth	Fifth
Door	5	4	7	6	9
Wall	21	25	19	23	18
Sundries	15	17	13	19	16
Equipment	3	8	2	4	3
Sample	30	22	36	27	38
Personnel	17	12	16	11	14

In order to avoid the influence of the complexity of the experimental scene on the experimental operation and ensure the realistic and accurate experimental results, this paper adopts the response time and priority of the intelligent control of the doors, walls, debris, equipment, samples and personnel in the virtual experiment. The influence of the complexity of the experimental scene on the intelligent control is studied. As shown in Figure 2, in addition to the intelligent control of the experimental samples, non cross able obstacles such as walls and debris have the greatest impact on the intelligent control, and the response time of the device is the shortest.

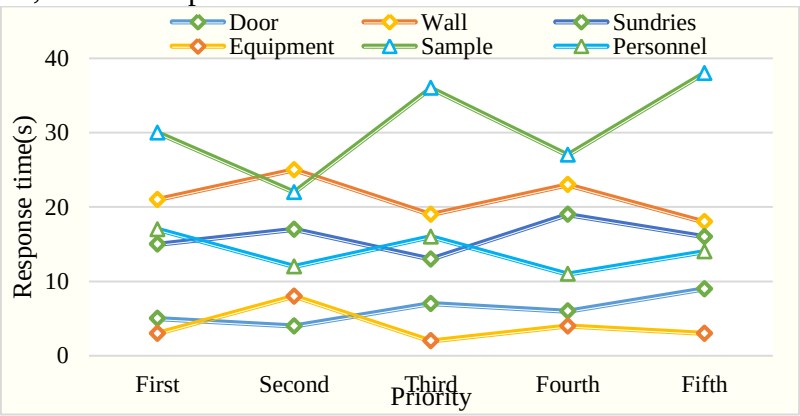

Figure 2. Intelligent control situation of virtual experiment scene

4.2. Effects of Liuwei Dihuang Pills on the Semen Quality of Mice

In this paper, six groups were set up according to related researches: BC blank control group, NC negative control group, VE inhibition group, OLA inhibition group, APS inhibition group and LWDH treatment group to conduct experiments to study the effect of different drug control on the quality of semen in mice. As shown in Table 3, the blank control group reflects the sperm density, sperm motility, sperm survival rate, and sperm deformity rate in the normal reproductive system of healthy mice. Similarly, the other groups also reflected their respective effects on semen quality.

Table 3. Effects of different drug treatments on the quality of mouse semen

Group	BC	NC	VE	OLA	APS	LWDH
Sperm density	87.68	84.33	46.76	54.75	46.23	98.67
Sperm motility	64.59	63.12	24.76	45.38	25.17	81.36
Sperm survival rate	71.25	76.83	64.66	74.29	60.84	86.34
Sperm deformity rate	14.27	17.53	29.36	25.17	48.54	10.34

As shown in Figure 3, compared with the blank control group, under the action of the three drug suppression groups, sperm viability, vitality and sperm density in the epididymis of mice showed a downward trend, and the rate of sperm abnormalities showed an upward trend. In the Liuwei Dihuang Wan treatment group, sperm density, vitality and survival rate all increased significantly, and the rate of sperm deformity also decreased, indicating that Liuwei Dihuang Wan had a positive effect on the quality of mice semen.

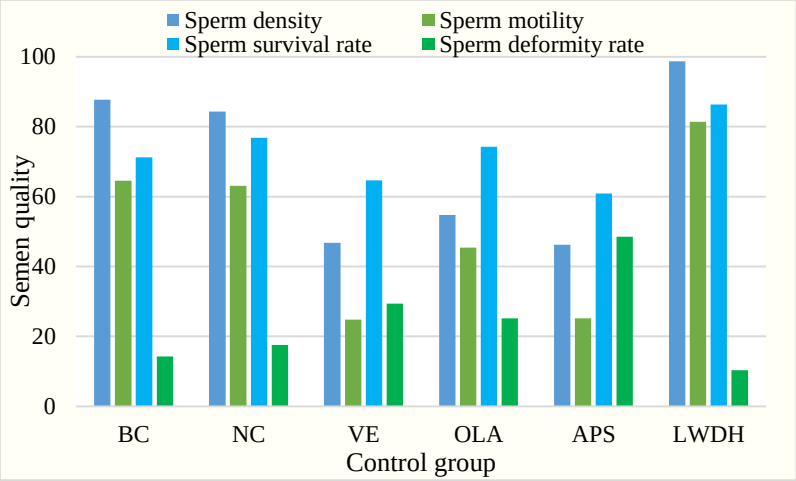

Figure 3. The effect of drug control on the quality of mouse semen

4.3. Liuwei Dihuang Pills on Gene Expression of Testosterone Synthesis Related Enzymes in Mice

According to related studies, the synthesis of testosterone in mice is mainly affected by the expression of SOD, GSH, MDA, and LPO and other related enzyme genes. In order to study the effect of Liuwei Dihuang Wan on the expression of these enzymes related to testosterone synthesis, this article discusses the expression of these enzyme genes in the experiment. The situation was

tested and analyzed. As shown in Table 4, SOD, MDA and LPO are enzyme genes that inhibit testosterone synthesis in mice, and GSH is an enzyme gene that promotes testosterone synthesis.

Table 4. Effects of different drug treatments on testosterone synthesis in mice

Group	BC	NC	VE	OLA	APS	LWDH
SOD	15.39	15.37	15.72	16.28	16.84	14.36
GSH	67.46	67.63	58.39	61.19	57.56	73.64
MDA	3.54	3.25	4.13	3.67	3.81	3.12
LPO	1.72	1.78	2.04	1.97	1.92	1.63

As shown in Figure 4, compared with the blank control group, the activity of SOD in the testis tissue of mice showed an upward trend with the inhibitory effect of VE and other drugs, while the activity of SOD in the Liuwei Dihuang Wan treatment group had a significant downward trend. In addition, for the GSH and other enzyme genes that promote the antioxidant function of mouse testis tissue and testosterone synthesis, Liuwei Dihuang Wan has a significant effect on promoting the expression of such enzyme genes.

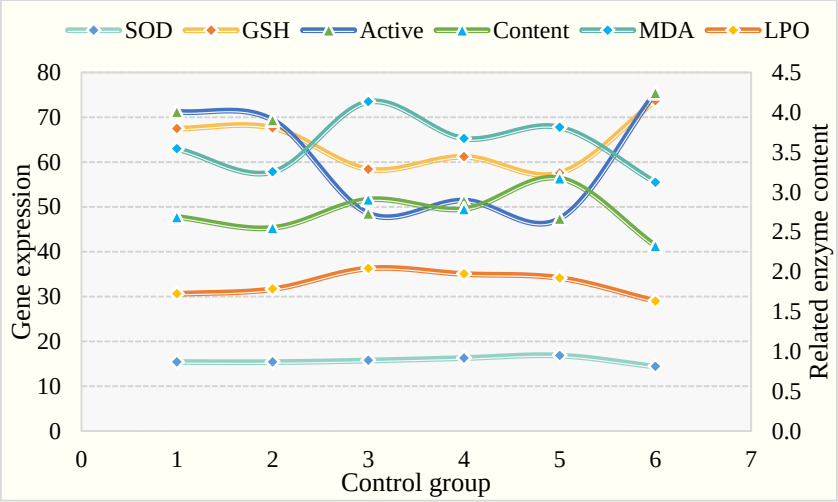

Figure 4. Effect of drug control on gene expression of testosterone synthesis enzymes in mice

4.4. Repairing Effect of Liuwei Dihuang Pills on Renal Function

Renal function is an important component of reproductive system function. This article studied the effect of drug control on mouse renal function by setting up different control experimental groups. The main monitoring indicators of renal function are uric acid UA, blood creatinine HB, serum urea SU and blood globulin BC. The effects of different drugs in the control group are shown in Table 5.

Table 5. Effects of different drug treatments on testosterone synthesis in mice

Group	BC	NC	VE	OLA	APS	LWDH
UA	86.74	83.56	45.78	73.86	45.37	93.92
SU	63.69	61.24	28.53	47.36	31.24	80.19
HB	71.64	76.73	65.37	74.16	60.24	84.32
BC	16.53	12.28	28.36	22.17	27.54	10.02

As shown in Figure 5, in addition to hemoglobulin, under the drug treatment of Liuwei Dihuang Pills, various renal function indicators of mice have been significantly improved and improved. These renal functions are an important guarantee for repairing reproductive system damage. Compared with the blank control group, VE and other inhibitory drugs have a significant inhibitory effect on renal function. Under the inhibition of these drugs, the renal function of mice shows a downward trend, which may cause renal failure and may cause reproductive system damage.

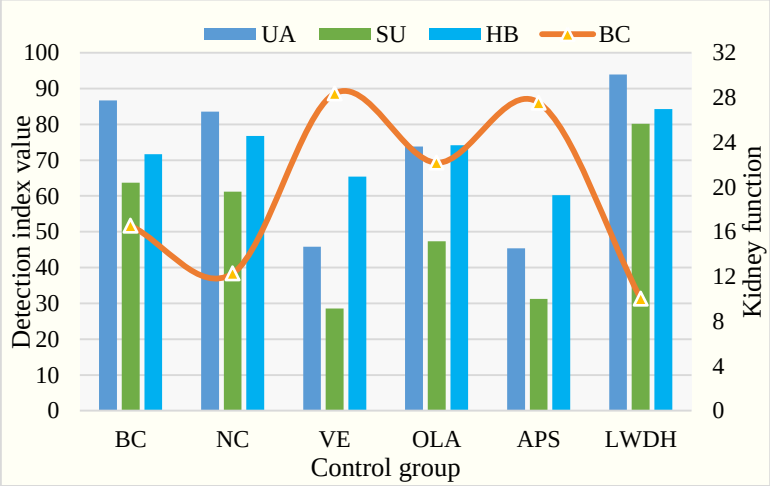

Figure 5. The repair effects of different drugs on renal function

4.5. Comparative Analysis of Mouse Reproductive System Function Before and After Treatment

In this paper, the renal function and reproductive system function of mice before and after the medical experiment with Liuwei Dihuang pill were compared. As shown in Table 6, there was no significant difference in the blood creatinine and urea nitrogen between the treatment group taking Liuwei Dihuang Wan and the control group without any treatment before treatment, while the creatinine and urea nitrogen of the treatment group and mice after treatment decline.

Figure 6. Controlled experimental analysis of mouse reproductive system function

Functional indicators	VE	OLA	APS	LWDH	Before	After
Leukocyte	36.27	16.38	21.58	28.41	22.97	37.98
Red blood cell	33.74	12.14	15.62	20.19	16.38	31.37
Platelets	29.84	14.29	18.37	24.73	25.64	40.64
Hemoglobin	41.28	10.26	12.39	18.59	15.36	30.32
Kidney function	24.66	15.98	14.76	21.36	24.13	39.13
Reproductive system	39.47	13.14	19.64	15.64	16.98	31.96

In addition to the comparative analysis of the mouse reproductive system function before and after the experiment, this article also carried out a horizontal comparison between the control group and the Liuwei Dihuang Wan treatment group through each drug control group. As shown in Figure 6, the reproductive system function of the Liuwei Dihuang Pill treatment group improved significantly after treatment, while the reproductive system function of the blank control group still

fluctuated around 16.98. In addition, hormones and drugs such as OLA also have a certain effect on the function of the reproductive system, but it is not obvious.

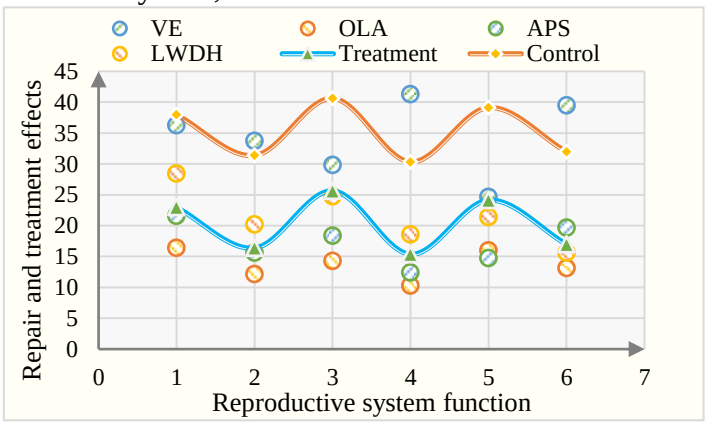

Figure 6. Comparison of mouse reproductive system function before and after treatment

5. Conclusion

This article mainly focuses on the repair and treatment of male reproductive system damage. After investigation, it is found that the current repair treatment of male reproductive system damage is mainly through hormones and auxiliary treatment of Chinese medicine, but it is not possible to accurately detect and control the effect of drugs during the treatment. Happening. Based on this, this article proposes to combine Liuwei Dihuang Wan traditional Chinese medicine treatment with modern medical technology through virtual reality intelligent medical experiments. Not only can it more accurately and intuitively observe the action process of drug treatment, but also the experiment shows that Liuwei Dihuang Wan combines modern medical technology The curative effect is also more significant. In the virtual reality medical experiment, this article has completely tested and observed the diffusion and action of the main components of Liuwei Dihuang Pills. Compared with the actual mouse reproductive system injury treatment experimental data, it can more clearly analyze the effects of Liuwei Dihuang Pills on the reproduction of male mice. The repair of system damage is of great significance to the development of medical experiments.

According to the principle of virtual reality technology and three-dimensional matrix transformation, this paper processes, transforms and reproduces the data image sequence of the virtual experiment to create a realistic virtual experiment environment. Based on the virtual reality medical experiment results of Liuwei Dihuang Pills for the treatment of male mice's reproductive system damage, this study combines Liuwei Dihuang Pills with modern medical technology to provide kidney therapy without setting up a large number of physical control groups for experiments, greatly reducing the number of physical animal samples required , And the process of the experiment and the effect of the drug can be more accurately analyzed and improved accordingly. In addition, based on the results of sample testing and reliability estimation, the reliability of the conclusions drawn from experimental data in this study can reach 93.74%, which shows that the conclusions of this study are true and reliable.

Since Liuwei Dihuang Pill is an over-the-counter Chinese medicine developed for the purpose of nourishing and repairing kidney function, it is not clear whether it has other adverse reactions to the human body and drug contraindications. In addition, damage to the male reproductive system is not only affected by the function of the kidneys, but also by the interaction of other organs and the physiological system of the human body, and the diagnostic and evaluation criteria for the function

of the reproductive system are not uniform. Therefore, this study has certain limitations and deficiencies in the repair and treatment of male reproductive system damage. I hope that in the future, we can conduct in-depth research from these aspects, make full use of the advantages of virtual reality intelligent medical experiments, and provide better treatment options for the repair and treatment of male reproductive system injuries.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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