Automatic Dispensing Technology of Traditional Chinese Medicine Formula Granules in Pharmacy Under the Background of Artificial Intelligence

Wenjing Wang(✉)

Shaanxi University of Chinese Medicine Xi'an, Shaanxi, China
SUCM200101@126.com

Abstract. At present, the research and application of artificial intelligence technology in the field of traditional Chinese medicine has become one of the important methods of modern inheritance strategy of traditional Chinese medicine. In this paper, under the background of artificial intelligence, the application of automatic dispensing technology of traditional Chinese medicine formula granules in pharmacy is studied. In this paper, two hospitals in a city were compared. Hospital a was the control group, and hospital B was the experimental group. Through experimental observation and data collection, it was found that the data of hospital B pharmacy using artificial intelligence automatic dispensing technology was better than that of hospital A in all aspects during the experiment. During the experiment, hospital A pharmacy processed 1056 prescriptions in total, which took 2110 min, and the experimental evaluation was 80 points, while hospital B pharmacy processed 1056 prescriptions During the experiment, 2317 prescriptions were processed in our hospital, which took 1853 min, and the experimental evaluation was 98 points. Moreover, the data of pharmacy of hospital B in dispensing accuracy, storage environment, drug control and other aspects were better than that of hospital A.

Keywords: Artificial intelligence · Dispensing granules of traditional chinese medicine · Automatic dispensing technology · Pharmacy taking medicine

1 Introduction

With the rapid development of science and technology, artificial intelligence technology is also developing rapidly, many industries are involved in the application of artificial intelligence, pharmaceutical industry is no exception [1, 2]. As the cultural treasure of the Chinese nation, traditional Chinese medicine has gone through thousands of years of development, and it should be protected, promoted and inherited no matter from the perspective of cultural heritage or medical resources [3, 4]. In recent years, the traditional Chinese medicine formula granule is a new dosage form with rapid development. It has the advantages of rapid action, small size, convenient use, convenient transportation and

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so on, so it is welcomed by the majority of patients [5, 6]. However, due to the influence of traditional Chinese medicine formula granule seed, curative effect and traditional medication habits, it brings certain difficulties to the extensive application of traditional Chinese medicine formula granules [7, 8].

Through the application of modern mechatronics and information technology, the automatic dispensing work of traditional Chinese medicine formula particles is carried out. The amount of drug required is automatically grasped as much as it is needed. A complete set of intelligent solutions is provided for the dispensing process of Chinese pharmacy, so as to improve its operation efficiency, modernization and informatization level, It is helpful to solve the problems of high error rate, bad environment, low automation and low efficiency in traditional Chinese pharmacy, reduce manual operation, ensure the quality and safety of patients' medication to a certain extent, and improve the standardization, standardization and modernization level of the whole Chinese medicine industry [9, 10].

This study first introduces the application of artificial intelligence in the dispensing of traditional Chinese medicine, and then expounds the automatic dispensing technology of the dispensing of traditional Chinese medicine. Then, under the background of artificial intelligence, this paper applies the automatic dispensing technology of the dispensing of traditional Chinese medicine to the pharmacy. In order to study the advantages of the automatic dispensing technology of the dispensing of traditional Chinese medicine, two hospitals in a city are selected as the research objects The object of this study is to compare and analyze the experiment data, and analyze the advantages of the automatic dispensing technology of traditional Chinese medicine formula granules in the pharmacy.

2 Proposed Method

2.1 Application of Artificial Intelligence to Traditional Chinese Medicine Formula Granules

With the rapid development of science and technology, the application of artificial intelligence has penetrated into all aspects of our life, including traditional Chinese medicine. The application of artificial intelligence in traditional Chinese medicine granules involves servo control and servo control, which usually refers to closed-loop control, that is, to measure the change of controlled object through feedback regulation, so as to modify the control technology of motor output. In this process, PID algorithm is often used. The expression of PID control algorithm to realize integral separation by computer is as follows:

$$U(i) = K_p \left\{ e(i) + \frac{T}{T_i}\beta \sum_{j=0}^{i} e(j) + \frac{T_d}{T}[e(i) - e(i-1)] \right\} \tag{1}$$

$$\beta = \begin{cases} 1 & |e(i)| \le \Delta X_{ma} \\ 0 & |e(i)| > \Delta X_{ma} \end{cases} \tag{2}$$

Where, i is the sampling sequence number, *e(i)* is the position deviation input by the error calculator at the time of subsampling, *U(i)* is the control value output by the

computer at the i-th sampling time, T_i is the integral coefficient, T_d is the differential coefficient, K_p is the proportional coefficient, T is the sampling period, and β is the common switching coefficient of the integral term.

2.2 Automatic Dispensing Technology of Dispensing Granules of Traditional Chinese Medicine

Traditional Chinese medicine dispensing refers to the operation technology of accurately preparing traditional Chinese medicine for patients according to the traditional Chinese medicine drugs listed in the Clinical Prescriptions of traditional Chinese medicine doctors. Generally, there are six links such as drug inspection, pricing, dispensing, review, packaging and distribution. The pharmacy personnel take the medicine according to the doctor's prescription. The method is to take the ingredients in the order of prescription medicine, weigh them, and then mix them. Most prescriptions have at least a dozen kinds of drug materials, and the dosage requirements of each drug material are very accurate. Therefore, pharmacy personnel need to focus on and operate carefully to avoid taking the wrong or misweighing the dosage, so the traditional way of drug delivery has great disadvantages.

Automatic dispensing technology of traditional Chinese medicine formula granules is used for dispensing of traditional Chinese medicine formula granules. It can complete the actions of drug identification, weighing measurement, compatibility taboo reminder, etc. according to the dosage, taste, dosage and other formula parameters of doctor's prescription. The equipment has high precision and accuracy, fully reflecting the theoretical essence of "syndrome differentiation and treatment, plus and minus with syndrome, flexible medication" of traditional Chinese medicine, It has realized the real automatic regulation of traditional Chinese medicine formula granules.

3 Experiments

(1) Research object

In this paper, two hospitals in a city were tested and compared. Hospital a was the control group, the hospital pharmacy management was mainly based on the traditional way of taking medicine, hospital B was the experimental group, the hospital pharmacy used the artificial intelligence automatic dispensing technology, the research scope was the traditional Chinese medicine formula granule prescription.

(2) Evaluation index

In this paper, through a week-long experimental study, data collection is carried out through video monitoring, personnel observation and questionnaire visit to hospital patients. The scope of data collection mainly includes: the number of prescription of traditional Chinese medicine granules, the time consumed in the prescription of traditional Chinese medicine granules, the number of lost traditional Chinese medicine granules drug bags, the staffing of hospital pharmacy. After the end of the experiment, the

following aspects are discussed Evaluation: dispensing accuracy, storage environment, dispensing convenience and drug control.

4 Discussion

4.1 Key Technology Analysis of the Application of Automatic Dispensing Technology of Traditional Chinese Medicine Formula Granules in Pharmacy Under the Background of Artificial Intelligence

Under the background of artificial intelligence, the realization of automatic dispensing technology of traditional Chinese medicine granules depends on the following key technologies:

(1) High precision and high efficiency particle blending technology

The dispensing accuracy of traditional Chinese medicine formula granules is measured by weight. Because the dispensing task of a prescription is carried out continuously and completed in a very short time and in a very small range, there is little difference between boxes (bags). Therefore, the weight check data of the whole prescription can be used to monitor, modify and adjust the dispensing process and results of a single box (bag), while improving the dispensing accuracy, However, it will affect the adjustment efficiency.

(2) High reliability drug identification technology

The traditional Chinese medicine dispensing system usually uses barcode and RFID (radio frequency identification) technology for drug identification. In particular, RFID technology can identify high-speed moving objects and multiple tags at the same time, which is fast and convenient to operate. Under the condition of being covered, RFID can penetrate non-metallic or non transparent materials such as paper, wood and plastic, and carry out penetrating communication, with strong anti-interference, so it is very suitable for particle identification on dispensing equipment. RFID tags are water-proof, oil-proof, dust-proof and pollution-proof, supported by highly reliable information encryption and verification algorithm, which can solve the problem of wrong drug delivery.

(3) Closed loop control precision transmission technology

The result of the dispensing is to send the drug particles to the corresponding containers. The container is positioned by its position. If the container is transported and positioned incorrectly, the medicine will be loaded in the wrong place, causing the wrong medicine and leakage. In order to prevent the accidental errors of software and hardware in the control system and improve the anti-interference ability of the system, the equipment can adopt the precise transmission of closed-loop control, and add multiple redundant detection points to ensure the accurate and reliable movement. And according to the relevant management regulations, in the key links of man-machine dialogue, multiple reviews, to ensure that the dispensing is accurate, not wrong medicine.

(4) The equipment adopts closed-loop control precise transmission technology for positioning, box by box (bag) automatic drug distribution and automatic packaging, and man-machine dialogue for multiple reviews, so as to provide complete drug type correctness inspection and high reliability drug distribution and packaging function, and avoid drug dispensing errors in the process of manual dispensing.
(5) Rapid and automatic dispensing of various particles

The intelligent dispensing system of traditional Chinese medicine dispensing granules is controlled by the computer in the whole process, which can be linked with his system of the hospital to realize intelligent dispensing in the whole process, automatic downloading of prescriptions, automatic measurement, automatic sub packaging, automatic sealing and information recording in the whole process. The whole process voice and information prompt, the equipment can also be installed with an automatic detection module, which can automatically detect the status of all modules, motors, sensors, etc. of the whole machine, and automatically alarm when a fault is found, and recover the coordination work after the fault is removed.

4.2 Analysis of Application Results of Automatic Dispensing Technology of Traditional Chinese Medicine Formula Granules in Pharmacy Under the Background of Artificial Intelligence

In this paper, two hospitals in a city, a hospital and B hospital, experimental data collection is shown in Table 1.

Table 1. Application of automatic dispensing technology of traditional Chinese medicine formula granules in pharmacy under the background of traditional methods and artificial intelligence

Research object	Number of prescriptions	Dispensing time (min)	Medicine loss (bag)	Staffing (PCs.)
Hospital A	1056	2110	51	2
Hospital B	2317	1853	4	1

It can be seen from Table 1 that hospital a took 1056 drugs in the pharmacy during the experimental study period, which took 2110 min in total. The average time for each drug was about 2 min, and the total loss was 51 bags. The proportion of pharmacy staff was 2 people, while hospital B took 2317 drugs in the pharmacy during the experiment period, which took 1853 min in total, and the average time for each drug was about 0.8 min, the total loss is 4 bags, and the proportion of pharmacy staff is 1 person.

After the experimental observation, the application of the automatic dispensing technology of traditional Chinese medicine formula granules in the pharmacy was evaluated by comparing the traditional method with the artificial intelligence background. The experimental evaluation results are shown in Fig. 1.

After the end of the experiment, by comparing the four aspects of dispensing accuracy, storage environment, dispensing convenience and drug control of the two hospitals,

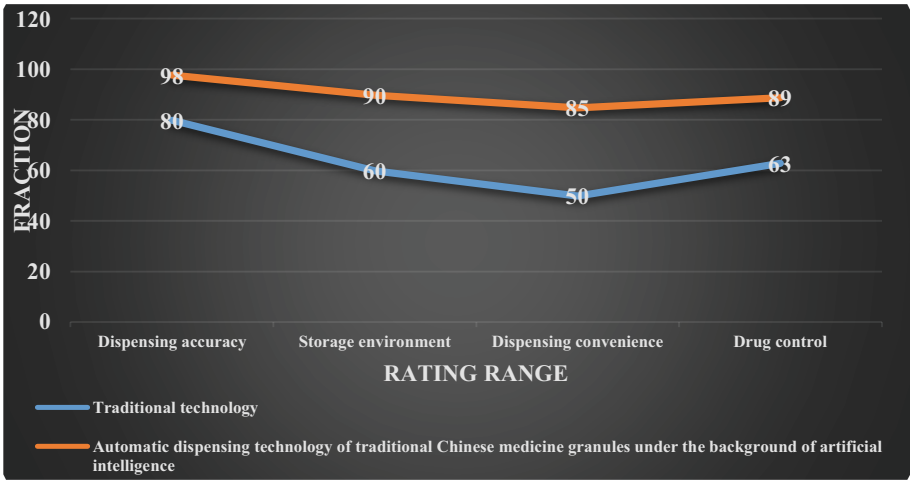

Fig. 1. Application evaluation of automatic dispensing technology of traditional Chinese medicine formula granules in pharmacy under the background of traditional methods and artificial intelligence

it can be seen from Fig. 1 that the score of a hospital pharmacy in dispensing accuracy is 80, while the score of B hospital in dispensing accuracy is as high as 98, in the pharmaceutical storage environment, the score of a hospital pharmacy is 60, while the score of hospital pharmacy is 90 Compared with the convenience of dispensing, hospital a pharmacy scored 50 points, hospital B pharmacy 85 points, hospital a pharmacy 63 points and hospital B pharmacy 89 points in terms of drug control. From the above scores, hospital B scored higher than hospital a in all aspects, which shows that the automatic dispensing technology of artificial intelligence Chinese medicine formula particles used in hospital B pharmacy is more scientific than the traditional pharmacy management method Effective.

From the above experimental data, it can be seen that the automatic dispensing technology using artificial intelligence Chinese medicine formula particles has more advantages in pharmacy management:

(1) The dispensing is accurate. In the dispensing process, the barcode scanning method is used to recheck the drugs to ensure the accurate distribution.
(2) The storage environment of drugs is good, the drugs are stored in a sealed environment, with waterproof and moisture-proof measures to ensure the quality of drugs.
(3) With the function of modern network management, the electronic formula can be generated on different computers in the hospital, and transmitted to the central database, then automatically classified and finally dispensed through the control platform of the dispensing machine.
(4) The operation is simple and reliable. The matching automatic dispensing system of traditional Chinese medicine has a good man-machine interface, which can operate

traditional Chinese medicine, prescription medicine and dispensing machine. The work intensity is greatly reduced. Only one person can complete all the procedures.

5 Conclusions

The development of artificial intelligence has been more than ten years, and the technology and application are gradually becoming mature. But at present, the hospital in our country still takes medicine by artificial. This paper studies the application of automatic dispensing technology of traditional Chinese medicine formula granules in pharmacy under the background of artificial intelligence, and with the development of artificial intelligence, In the future, the automatic dispensing technology of traditional Chinese medicine granules will further develop to the direction of higher automation, faster speed, networking, more intelligent and easy to use, and the pharmacy will gradually develop to the direction of intelligent and unmanned.

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