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Extraction of Egcg3me from Clinical Medical Tea Based on Internet of Things

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Abstract: There are many kinds of active components in tea. Among them, methylated catechin has the functions of anticancer, antimutagenic, antitumor, anti-inflammatory, antiviral, scavenging free radicals and antioxidation. This paper mainly introduces the research and design of egcg3me in clinical medical extracted tea based on Internet of things technology. In this paper, through the overview of medical Internet of things and the analysis of extraction methods of methylated catechin, the production process of traditional tea polyphenol extraction and methylated catechin purification was improved. Methylated catechin was purified by resin purification method and catechin monomer was separated and prepared. The tea powder was used as raw material, and the high purity methylated catechin was obtained by crystallization with macroporous adsorption resin Tea element monomer. In this paper, the effects of various factors on the extraction of tea polyphenols and the purification of methylated catechins were studied. The experimental results showed that the best adsorption effect of catechin was obtained when the adsorption flow rate was 1BV / h; when the elution flow rate was 2BV / h and the elution volume was 4-5 BV, the volume and concentration of catechin in unit volume were the largest. In terms of crystallization, when the concentration of solution is 30%, the crystallization time is 4 days, and the crystallization temperature is 4 ℃, the effect of catechin is the best. It can be seen from the above results that the new technology of tea polyphenol extraction and methylated catechin purification has the advantages of simple process, short production cycle, low cost and high yield, which has a good development prospect.

1. Introduction

In China, tea has a long history of drinking. In addition to its unique color and fragrance, tea also has rich nutritional and medicinal value. Tea is rich in polyphenols, and its activities are mainly

manifested in lipid-lowering, anti-oxidation, anti allergy, inhibition of pathogenic bacteria, prevention of cardiovascular disease, prevention of cancer and regulation of intestinal condition. Catechins are a kind of polyphenol compounds [1]. Catechins in tea have physiological activities such as weight loss, lipid reduction, antioxidant, antibacterial and so on. Methylated catechin (EGCG3''Me) is a catechin derivative formed after hypermethylation, which has high digestion and absorption rate and stability in the body [2]. At present, Japanese scholars have found that it can significantly prevent and inhibit the common pollen allergy. At the same time, some domestic scholars have studied its antioxidant activity in vitro and its liver protective effect, which can inhibit the toxic effect of alcohol on HepG2 cells. In foreign countries, the application research of methylated catechin is more in-depth, and some functional products have been successfully developed. At present, there are relatively few studies on the effect of methylated catechin on reducing lipid and weight loss in China. Therefore, it is of great scientific and practical significance to study the activity of methylcatechin [3].

In recent years, domestic and foreign experts and scholars have made a lot of research on the role of methylated catechin, mainly focusing on lipid-lowering, antioxidant, antibacterial, anticancer and other aspects. Neiva et al. studied the inhibitory effect of Catechin on human platelets. They stimulated platelets with adenosine diphosphate, arachidonic acid and epinephrine, and treated the stimulated platelets with catechin. The protective effect of tea catechins on platelet aggregation and platelet aggregation showed that tea catechins could protect platelets from oxidative stress. But his research is not comprehensive. Inoue used DPPH free radical scavenging method to compare the antioxidant effect of tea polyphenols and sorghum red pigment and their separate use. The results showed that when the content of tea polyphenols was 6g / ml and the content of sorghum red pigment was 193.76g/ml, the scavenging ability of the compound was lower than that of the same amount of tea polyphenols or sorghum red pigment alone. However, he did not use other comparative methods to verify the results [4]. Aditya was prepared by two step emulsification method. The water and oil double emulsion containing catechin and curcumin was prepared, and its physicochemical properties were characterized. The experimental results showed that encapsulation of catechin and curcumin in emulsion could significantly improve the stability of catechin and curcumin in simulated gastrointestinal fluid, but he did not test the effect in real human gastrointestinal fluid [5].

The main content of this paper is to extract EGCG3"Me from clinical medical tea based on Internet of things technology. Using the application of the Internet of things in clinical medicine, a clean production process of methylcatechin with low cost, high yield, high purity and low pollution is found, so that methylcatechin can play a more important role in medical and health care.

2. Internet of Things and Extraction of Methylated Catechin

2.1. Overview of Medical Internet of Things

(1) Concept of Medical Internet of Things

The medical Internet of things is the integration of the Internet of things technology and the medical field. Broadly speaking, the medical Internet of things is the integration of the existing hospital network, including all the current hospital networks, including wired network, wireless network, digital network, mobile communication network, sensor network, etc., it is the horizontal extension and expansion of the existing network [6]; and the narrow sense of medical Internet of things only refers to the perception terminal End connected sensor networks. The realization of the medical Internet of things is to bind the intelligent sensing devices such as RFID tags, bar codes, sensors, infrared sensors and other medical reading objects (medical devices, personnel, drugs, biological agents, etc.), integrate them into various hospital information systems by means of

network communication, and connect to his system, a large-scale integrated platform of the hospital, so as to realize the intelligent perception and data acquisition of medical objects set, remote monitoring, information sharing and other functions are applied to hospital personnel management, goods management, medical care, environmental monitoring and information management and many other aspects, optimizing the traditional service mode of the hospital and improving the overall efficiency of the hospital [7-9].

(2) Application Mode of Medical Internet of Things

The current application of Internet of things technology in hospitals includes infant anti-theft, medical device positioning, drug tracking, medical waste tracing, hospital personnel and patient positioning, intelligent infusion, vital signs monitoring and other aspects [10-11]. Based on the analysis of the current application of the medical Internet of things, according to different data types, it is divided into two types: medical object positioning and medical object data real-time collection. The following is a brief introduction of several commonly used applications:

1) Medical Object Orientation Service Mode

Baby security. The principle of the infant anti-theft system is to bind the RFID tag to the infant and the parents, and realize the tag pairing. Only when the parent tag and the infant tag are matched, can they have the right to contact with the infant, otherwise a warning will be issued. At the same time, the application of electronic fence technology becomes the double insurance of infant safety. Through short-distance identification, when the unauthorized baby is close to the exit, a warning will be issued the entrance guard is closed automatically.

Medical equipment management. The Internet of things technology can monitor the basic information, maintenance records, inspection records, lending and borrowing records, relevant personnel records, equipment location, usage and other real-time monitoring by embedding RFlD tags on the equipment, so as to realize the intelligent management of medical equipment.

Medical waste tracking. The Internet of things technology can track and trace the whole life cycle of medical waste through the electronic label technology. Through the intelligent terminal system, we can collect the detailed information of the Department, date, handover person, type, quantity and other aspects of the waste, supervise and manage the whole process of medical waste from generation to treatment, so as to ensure the safety and improve the management level, The process of waste collection and transportation was standardized.

Drug traceability. The Internet of things technology plays an important role in the anti-counterfeiting and management of drugs. By attaching RFID tags to the drugs, the tags record the information of the production, processing, circulation, storage and sales of drugs, so as to realize the whole process tracking of drug life cycle.

2) Medical Object Monitoring Service Mode

Intelligent infusion detection. The infusion detection system can realize the intelligent perception of infusion speed, infusion volume and required time by gravity sensing technology, and display the infusion process in the computer terminal. When the infusion is about to be completed, the computer terminal will send out an alarm to prompt the medical staff to change in time. So as to realize the centralized monitoring and quantitative management of infusion, improve the work efficiency of medical staff and eliminate the occurrence of medical accidents.

Vital signs monitoring. The Internet of things technology can collect a series of vital signs data including body temperature, blood pressure, heart rate, etc. through the network transmission and data processing, the data is finally transformed into graphical data displayed on the medical staff terminal. Medical staff can monitor the patient's physical sign data in real time, and the system will send out an alarm when there is abnormal Medical staff can give timely diagnosis and treatment.

Intelligent bed detection. The intelligent bed detection system is composed of four parts, including intelligent mattress, Internet, middleware and workstation. It is used for real-time

monitoring of patient's activity. It embeds wireless sensor into a certain position of mattress to realize dynamic monitoring of heart rate, respiratory rate and sleep state of patients, and transmits detection data to middleware controller of Internet of things through Internet of things AP The Internet of things AP filters and parses the data, and finally stores the parsed data in the database for doctors to view [12].

Cold chain management. The cold chain management system can collect the temperature and humidity of the storage environment in real time and accurately by embedding the wireless sensor tag into the storage cabinet, and transmit the collected data to the monitoring system. When the temperature and humidity of the storage environment exceeds a certain threshold, the monitoring system will send out an alarm, and relevant workers can adjust it in time, so as to ensure the quality and safety of vaccines, blood and other biological agents

2.2. Overview of Methylated Catechin

(1) Composition and Structure of Methylated Catechin

Catechin is a kind of polyphenols with the highest content in tea. Epigallocatechin gallate (EGCG) is one of the most antioxidant components in tea, and its content is the highest. Methylated EGCG is a derivative with unique physiological activity, which is formed by the substitution of phenolic hydroxyl group of EGCG with methyl ether. The main methylated catechins were (-) - epigallocatechin 3-O (3-O-methyl) gallate (EGCG3''Me) and (-) - epigallocatechin 3-O (4-O-methyl) gallate (EGCG3''Me) [13-15]. The structural formula of methylated catechin is shown in Fig. 1. The results showed that the content of egcg3 "me in tea was mainly affected by the following factors: tea varieties, tea maturity and processing technology. As shown in the figure 1

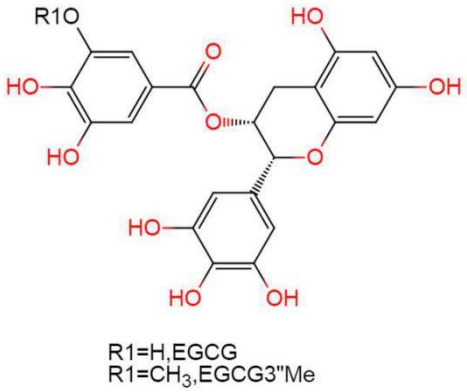

Figure 1. EGCG and EGCG "Me structures

(2) Anti-Allergic Effect of Methylated Catechin

In recent years, the physiological activity of EGCG3" Me has been studied more about its prevention, remission and treatment of allergy. A large number of experimental studies have shown that egcg3" me has obvious preventive and therapeutic effects on common pollen allergy. FcεRI, as an immunoglobulin E(IgE) receptor, plays an important role in the severe chronic allergic reaction of human body. It is found that egcg3 "me can reduce the expression of FcεRI on the cell surface, mainly by inhibiting the cross-linking between FcεRI subunits, thereby inhibiting the secretion of pro-inflammatory factors by basophils, thus reducing the number of inflammatory factors Histamine release [16]. In addition, the antiallergic effect of EGCG3" Me may be mediated by the 67kDa laminin receptor (67LR) on the cell surface, which inhibits the phosphorylation of myosin II regulated light chain (MRLC) or extracellular signal regulated kinase 1 / 2 (ERK 1 / 2).

(3) Hypolipidemic and Weight Reducing Effects of Methylcatechin

Foreign scholars have confirmed that EGCG, the promoter of 67 kDa laminin receptor (67LR), can inhibit the expression of TLR4 by upregulating E3 ubiquitin protein and ring finger protein 216 (RNF216). In addition EGCG3''Me as a highly absorbable 67LR agonist, significantly reduced the expression of TLR4 in adipose tissue. EGCG3''Me completely inhibited the up-regulation of tumor necrosis factor - α in adipose tissue and the increase of serum monocyte chemoattractant protein-1 induced by high-fat and high glucose diet. In addition, EGCG3''Me intake can prevent hyperinsulinemia and hypertriglyceridemia induced by high-fat and high glucose diet [17]. The anti obesity effect of tea polyphenols may be through the interaction with α - amylase to inhibit α - amylase, reduce the body's low carbohydrate digestibility, so as to achieve the purpose of reducing fat and weight. At present, it has been found that EGCG3''Me inhibits the activity of α - amylase through the synergistic effect of hydrophobic association and hydrogen bond formation between EGCG3''Me and α - amylase. In order to improve the utilization rate of EGCG3''Me in vivo, researchers prepared its phospholipid complex by phospholipid embedding technology and studied its physiological activity. The research method shows that its phospholipid complex has strong inhibitory effect on α - amylase and lipase. Therefore, it is speculated that EGCG3''Me may be the main active component of tea with lipid-lowering and weight reducing effect.

(4) Antioxidation of Methylated Catechins

Catechins usually have strong antioxidant activity due to the multi hydroxyl structure in the molecular structure. With the hydroxyl groups replaced by other groups, their derivatives show different antioxidant activities. Therefore, the antioxidant activities of catechins are different. By studying the antioxidant activity of rapeseed oil, the researchers found that the antioxidant activity of catechin decreased significantly after the methylation of catechin 3'-OH. This is because polyphenols with more hydroxyl groups can act as hydrogen acceptor or free radical acceptor, which makes resonance delocalization more stable due to the supply of protons or electrons and the free radical intermediates produced. Therefore, EGCG3''Me has a stronger inhibitory effect on the chain reaction of lipid oxidation the antioxidant activity of catechin is lower than that of unmethylated catechin [18-20].

(5) Protective Effect of Methylated Catechin on Liver

EGCG3''Me can protect the cryopreserved hepatocytes from freezing injury. Since ROS production is the main cause of cell injury induced by freezing, EGCG3''Me may play a protective role by scavenging ROS [21]. Studies have shown that EGCG3''Me can effectively alleviate the freezing injury of primary mouse hepatocytes under cold storage.

2.3. Extraction of Methylated Catechin

(1) Extraction Methods of Tea Polyphenols

The main component of tea polyphenols is methylated catechins, so to extract methylated catechins, tea polyphenols must be extracted first. With the continuous development of science and technology, people put forward higher requirements for the utilization of tea polyphenols and its by-products. The traditional extraction methods of tea polyphenols mainly include solvent extraction, metal ion precipitation, resin adsorption, supercritical fluid extraction, etc. many new extraction methods have been developed on the basis of the original extraction methods.

1) Microwave Assisted Method

The frequency of microwave is from 300MHz to 300GHZ. In the process of biologically active substances leaching, the water molecules in plant cells are directly affected to accelerate their free diffusion and reach the excitation state in a very short time. The water molecules impact the cell wall with their own irregular motion, which causes the sudden increase of the pressure in the cells

and the rupture of the cell wall. At the same time, the active substances in the cells are divided into two groups under the action of microwave, the rotational speed of the sub is also enhanced synchronously, and is rapidly released into the solvent, so as to achieve the purpose of extraction [22].

2) Ultrasound Assisted Method

The cavitation bubble in tea cell reaches resonance under the frequency of ultrasonic wave. In the sparse stage of sound wave, the small bubble expands rapidly and becomes larger. In the compression stage of sound wave, the small bubble is adiabatic compressed rapidly until the bubble burst. When the bubble reaches the limit of burst, a large amount of energy is released from the bubble, resulting in extremely high temperature and pressure The cell tissue structure of leaves was destroyed instantaneously, and the solvent quickly entered the cells. Under the action of high temperature and vibration, tea polyphenols accelerated the diffusion and dissolution speed from the cell to the solvent [23].

3) Aqueous Two Phase Extraction

The phase separation of the target products in the mixed solution is mainly due to the different partition coefficients of the target products in the two phases. In addition, the effect of the phase separation of the target products is determined by the charge interaction, hydrogen bonding, ion bonding and surface properties. In the aqueous two-phase extraction method, organic solution and inorganic salt solution are used as common solvents. Under the simultaneous action of intermolecular force, space and charge effects, the target product and other impurities present two phases in the solution due to different partition coefficients, so the test objective is achieved [24].

4) Ultrafiltration Membrane Method

Membrane separation technology, as the name implies, is based on the choice of membrane permeability, when the concentration or pressure is different balance to produce the movement through the membrane, so as to play the purpose of separation and purification. The pore size of 0.1μm is the basis to distinguish micro membrane from ultrafiltration membrane. Ultrafiltration membrane can separate organic matter efficiently to obtain target products.

5) Low Temperature Purification and Enzyme Extraction

As an efficient biological extraction method, according to the special activity of the biological enzyme, the mass transfer process is effectively strengthened, which directly acts on the cell wall and cell membrane, eliminates the obstruction channel of the active substances in the cell, and promotes the diffusion of the target product into the external solvent. In addition, the enzyme can also promote the dissolution of specific target products, so as to improve the production efficiency [25].

(2) Separation and Purification of Methylated Catechin

At present, there are three kinds of purification methods of methylated catechin: column chromatography, preparative high performance liquid chromatography and high speed counter current chromatography.

1) Column Chromatography

Column chromatography is the most commonly used separation and purification technology in scientific research. According to the structure and properties of the components of the sample, the adsorption in the column appears selectivity. Select the appropriate eluent to elute the sample adsorbed in the column, and then further vacuum distillation and drying to obtain the target product [26]. Column chromatography has outstanding advantages in the separation and purification process. It is not only simple, but also non-toxic and harmless solvent. In addition, the purified tea polyphenols by this method have high purity and biological activity, which is a kind of environment-friendly production process.

2) Preparative High Performance Liquid Chromatography

As an important method in chromatography, the sample solution and the adsorption liquid are respectively driven into the column as liquid and solid phases, and the separation power is driven by the difference of distribution coefficient through the high-speed and repeated movement of the two phases, so as to achieve the test objective [27]. This method can not only improve the yield on the basis of limited energy consumption, but also effectively avoid the overheating of the target product.

3) High Speed Countercurrent Chromatography

In high-speed countercurrent chromatography, the eluent is used as the stationary phase, and the liquid containing the sample passes through the eluent at a constant speed under the action of pump pressure. The driving force of the sample in the two liquid phases is different, so the rotation movement in the tube realizes the separation of substances [28]. High speed countercurrent chromatography (HSCCC) is operated in pure liquid environment, which not only abandons the disadvantages of solid material as support, but also achieves high sensitivity control, expands the application range, uses less solvent and has little influence on the target product.

4) Other Separation Technologies

Membrane separation, macroporous adsorption resin, polyamide and other separation technologies can effectively separate catechins, at the same time, it can achieve non-toxic, safe, simple process, suitable for large-scale industrial production.

3. Extraction of Methylated Catechin from Clinical Medicine Based on Internet of Things

In this chapter, methyl catechins were isolated and purified by macroporous adsorption resin, and then optimized by primary crystallization and related technical parameters.

3.1. Experimental Materials and Reagents

The materials used in this experiment are as follows: standard samples of catechins (EGCG, ECG, EC, C, EGC, CAF are 98%), ester catechins (EGCG purity 54.41%, ECG purity 14.45%), 95% ethanol (edible grade), acetonitrile (chromatographic purity), ascorbic acid (analytical purity), EDTA sodium salt (analytical purity).

The types of macroporous adsorption resins are HPD826, LX-8, D4006, XAD16N. As shown in Table 1, different adsorption capacities of macroporous resin are listed.

Table 1. Adsorption capacity of different macroporous resins

Resin name	EGCG adsorption capacity	ECG adsorption capacity
HPD826	30.58±0.05a	8.14±0.04b
LX-8	21.67±0.14b	8.16±0.03b
D4006	16.87±0.03c	7.96±0.04b
XAD16N	31.94±0.07a	8.87±0.04s

3.2. Experimental Methods

(1) Resin Pretreatment

Resin pretreatment method: soak macroporous adsorption resin in 95% ethanol solution for 24h to make it fully swelling, then wet column in glass chromatography column, and then elute with 95% ethanol. When the eluate is not turbid, it can be washed with distilled water until there is no obvious alcohol smell.

(2) Decolorization experiment of eluent

Since the oxidation products of catechin have certain color in the eluent, it has a great influence on the appearance of EGCG, so it is very important to remove the pigment. After decolorization, the column solution was concentrated at 45 ℃ and lyophilized to calculate the purity of methylcatechin.

(3) Crystallization and Purification of Methylated Catechin

Accurately weigh 10g of crude catechin monomer decolorized by decolorizing resin, dissolve in 40 ℃ warm water, prepare solutions of different concentrations, store in 20ml test tube, put it into the refrigerator for crystallization, after 24 hours, freeze centrifugation, filtration, repeatedly wash the crystal with distilled water, dry and weigh in low temperature vacuum.

4. Factors Affecting the Extraction of Methylated Catechin

4.1. Experimental Study on Dynamic Adsorption and Elution Velocity

(1) Effect of Adsorption Flow Rate on Adsorption Capacity of Methylated Catechin by Resin

Table 2. Penetration index of EGCG at three adsorption velocities

	1	2	3	4	5	6	7
1BV/h	0	0	0	0	0.01	0.28	0.81
2BV/h	0	0	0	0.01	0.17	0.41	0.82
3BV/h	0	0	0.01	0.22	0.58	0.79	0.82

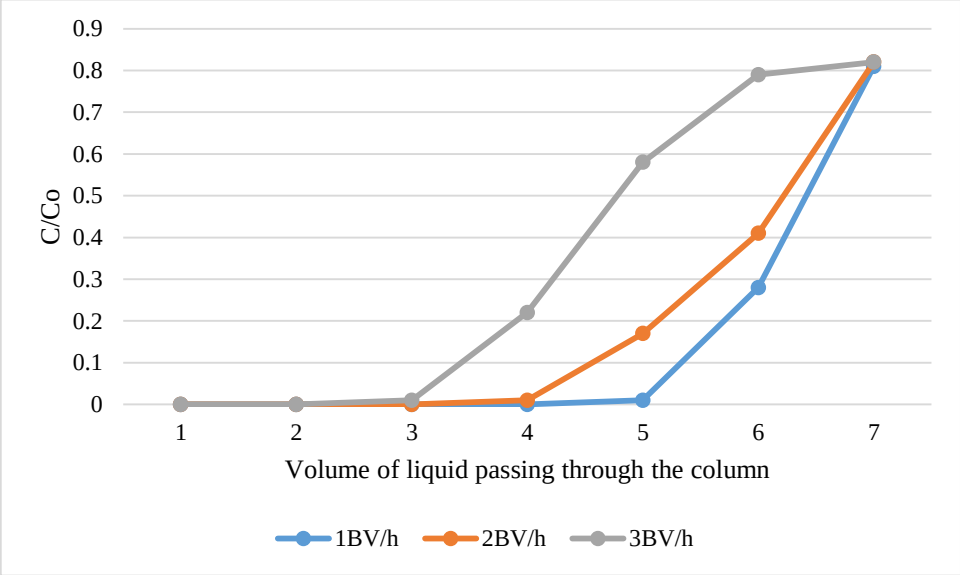

Figure 2. Breakthrough curves of EGCG at three adsorption velocities

As shown in Table 2 and Figure 2, when methylated catechin aqueous solution flows through the resin bed of 60g (about 100m1) wet resin at the flow rate of 1BV / h, EGCG leakage occurs when the outflow is 5BV. It can be considered that the resin has been saturated at this time, and the maximum adsorption capacity of EGCG is 22.8mg/g. When the flow rate is 2BV / h, EGCG leaks at 4bv, and at 3bv / h, EGCG leaks at 3bv / h. The leakage point of the two flow rates was earlier than that of 1BV / h. The main reason is that the flow rate affects the diffusion speed of solute to the resin surface. If the flow rate is too fast, the solute molecules will not be able to diffuse to the resin surface and the penetration phenomenon will occur. The experimental results showed that EGCG

was best adsorbed at a flow rate of 1 BV / h.

(2) Effect of Elution Flow Rate on EGCG Elution Efficiency

Table 3. Effect of different elution velocity on EGCG elution

	1	2	3	4	5	6	7
1BV/h	1194.4	1057.5	632.7	376.1	187.1	164.9	47.2
2BV/h	1385.5	1226.3	893.7	401.4	259.8	193.1	74.5
3BV/h	903.2	805.4	579.7	228.9	162.4	93.3	26.1

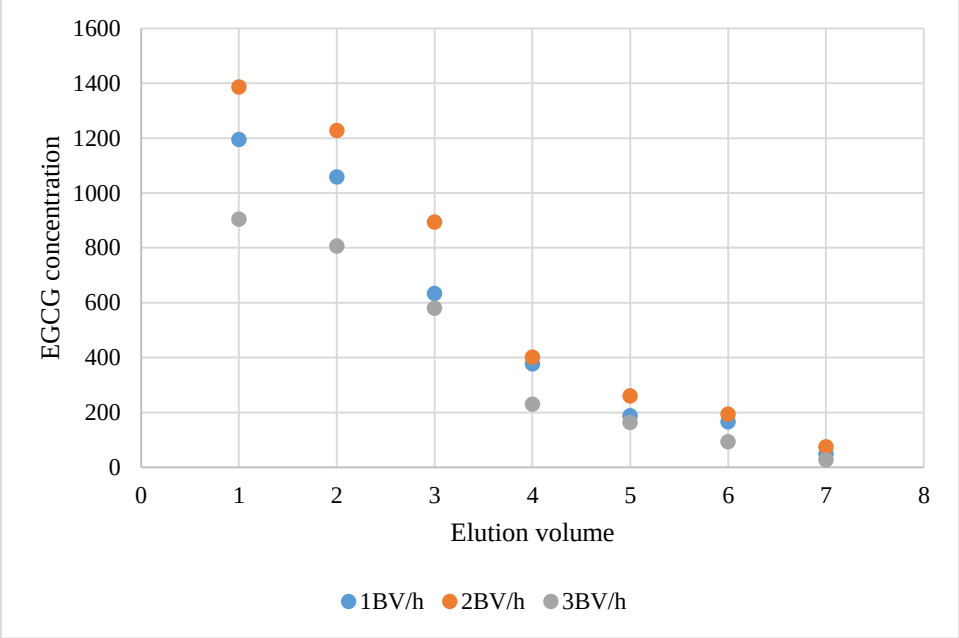

Figure 3. Effect of different elution velocity on EGCG elution

As shown in Table 3 and figure 3, EGCG concentration per unit volume is higher than 1BV / h and 3bv / h at a flow rate of 2BV / h, and the elution efficiency is the highest. When the flow rate is 1 BV / h, the elution flow rate is too small, resulting in tailing phenomenon. With the increase of flow rate, the liquid film on the surface of resin particles becomes thinner, and the resistance of liquid film decreases, resulting in the increase of mass transfer coefficient and mass transfer rate. At the flow rate of 3BV / h, the mass transfer rate increases, but the amount of EGCG per unit volume decreases due to the smaller mass transfer rate relative to the elution flow rate in unit volume. When the flow rate was 2 bv / h, the concentration of EGCG per unit volume was the highest, the yield of EGCG was the highest, and the elution volume could be controlled at 4-5 BV.

4.2. Crystallization Purification of Crude Methylcatechin

The purity of EGCG is over 90% after decolorization by decolorizing resin. In order to further improve the purity of EGCG, it is necessary to crystallize and purify the crude EGCG. Crystallization is the process of solute precipitation from solution, and its driving force is that the concentration of solute exceeds the solubility of solute under certain conditions, forming supersaturated solution. The effects of concentration of crystallization solution, crystallization time and crystallization temperature on the purity and yield of EGCG were investigated.

(1) Effect of Solution Concentration on Crystallization

Table 4. Effect of solution concentration on crystallization

Solution concentration	Crystal weight	Purity of EGCG	Crystallization yield
10%	N/A	N/A	N/A
20%	N/A	N/A	N/A
30%	1.08	96.04	80.43
40%	2.71	95.93	79.67
50%	2.83	94.87	78.91

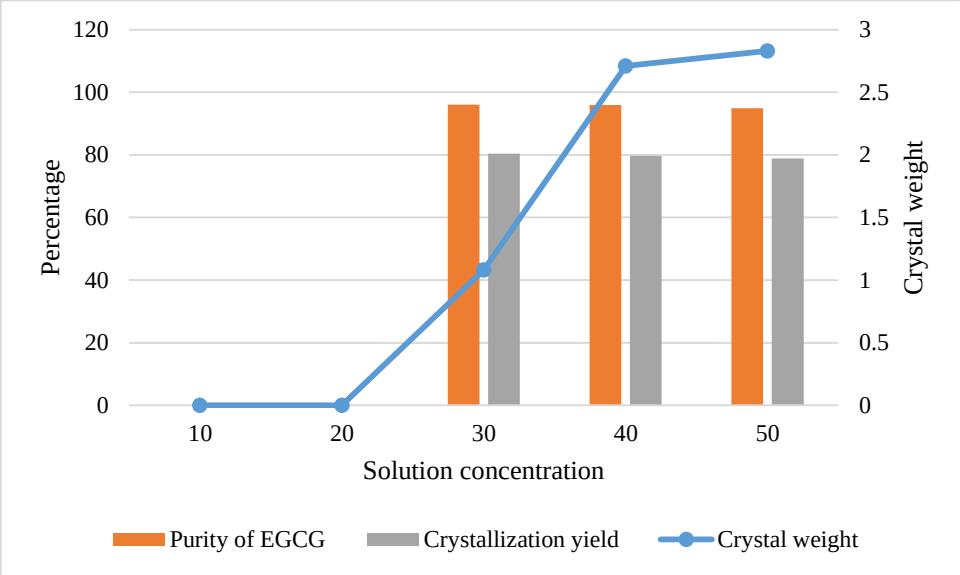

Figure 4. Effect of solution concentration on crystallization

As shown in Table 4 and Figure 4, it can be seen that no crystals appear in 10% and 20% solutions after one day of crystallization, indicating that it is difficult to precipitate crystals in low concentration solutions in a short time. The results show that with the increase of concentration, the time required for crystallization becomes shorter and the amount of precipitated crystals increases correspondingly. The higher the concentration, the more crystals precipitated in the same time. The purity comparison of EGCG shows that the purity of EGCG crystal precipitated from 30% solution is the highest, while the purity of EGCG crystal precipitated by 40% and 50% solution concentration is lower than 30% concentration. It may be due to the more amount of precipitated crystals, the more impurities such as residual pigment adhere to the crystal surface.

(2) Effect of Crystallization Time on Crystallization Effect

Table 5. Effect of crystallization time on crystallization effect

Crystallization time(day)	Crystal weight	Purity of EGCG	Crystallization yield
1	2.58	95.17	68.27
2	2.67	95.46	70.32
3	2.77	95.57	73.84
4	2.83	95.41	79.81
5	3.01	95.73	81.03

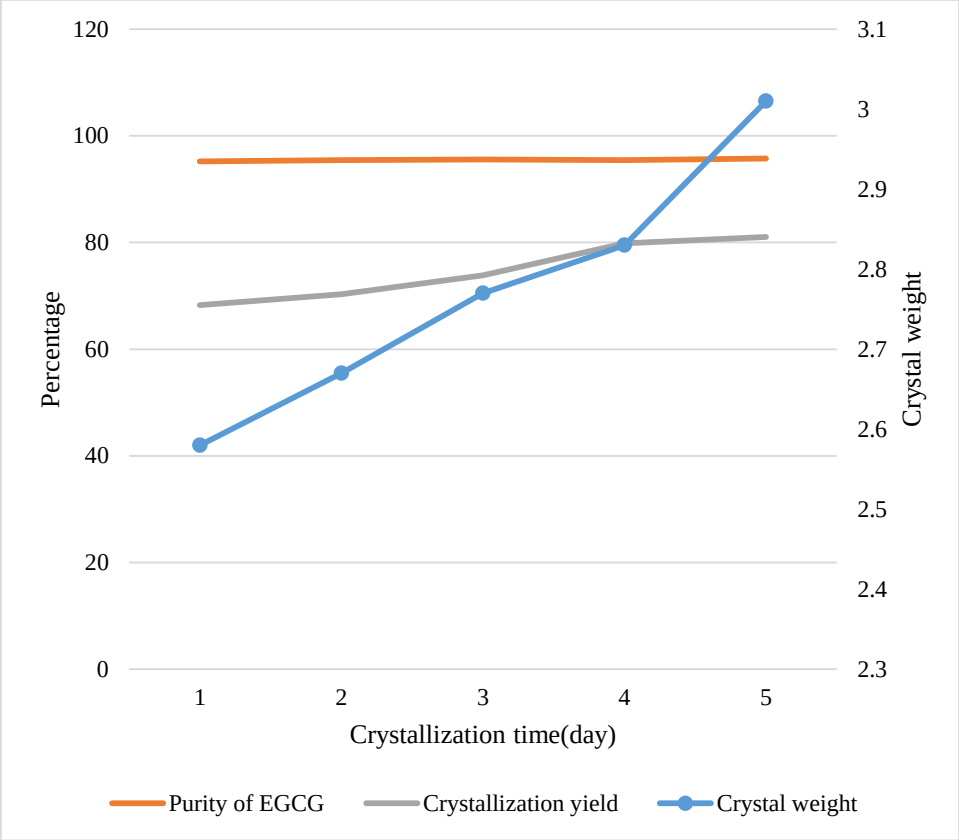

Figure 5. Effect of crystallization time on crystallization effect

As shown in Table 5 and figure 5, the amount of precipitation increases with the increase of crystallization time. The amount of crystal precipitation increased rapidly within 1-4 days of crystallization, and then slowed down after 4 days. The difference was not significant, indicating that it was difficult for the crystal to precipitate under the experimental conditions, so the crystallization time could be selected as 4 days. The purity of EGCG is stable at about 95%, which indicates that crystallization has obvious effect on improving the purity of EGCG. At the same time, the crystallization yield of EGCG is directly proportional to the crystallization time, and the crystallization yield of EGCG is stable at about 80% after 4 days of crystallization.

(3) Effect of Crystallization Temperature on Crystallization Effect

Table 6. Effect of crystallization temperature on crystallization

Crystallization temperature	Crystal weight	Purity of EGCG	Crystallization yield
2	3.17	94.37	80.41
4	3.05	95.74	79.62
6	1.68	95.13	78.38

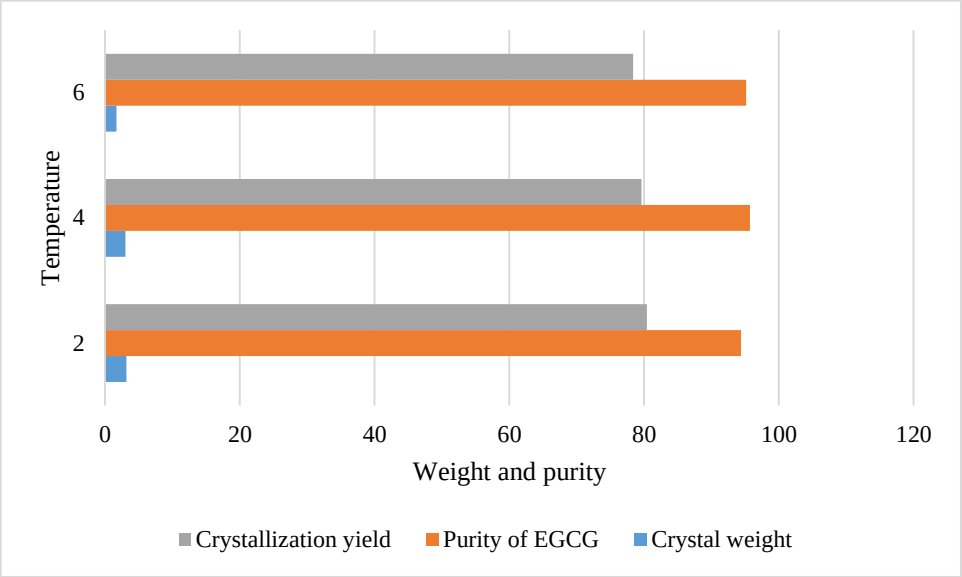

Figure 6. Effect of crystallization temperature on crystallization

As shown in Table 6 and Figure 6, due to the limitation of experimental conditions, the crystallization temperature is only selected as 2 ℃, 4 ℃ and 6 ℃. The results show that the precipitation weight of crystals at 2 ℃ and 4 ℃ has little change, which is more than 3 G, indicating that low temperature is conducive to the formation of crystals. However, at 6 "C, although there are some crystals precipitated, the crystal weight is reduced by nearly half, which indicates that the small change of temperature has great influence on the crystallization of solution. The purity of EGCG was the highest at 4 ℃.

5. Conclusion

Catechin is the main component of tea polyphenols. Catechin has been the focus of natural extract research at present because it has good pharmacological and health effects. In this paper, the methylcatechin was extracted from clinical medical treatment based on Internet of things technology, traditional extraction method of tea polyphenol and methylcatechin were studied and improved by Internet of things technology. Methylcatechin monomer was separated and prepared by resin method. The high purity methylcatechin monomer was obtained by the extraction of tea extract tea powder and adsorption and elution by macroporous adsorption resin.

In this paper, the optimal resin was selected by comparing the static adsorption and desorption capacity of four kinds of resins for methylcatechin. In this paper, three indexes of adsorption velocity, ethanol concentration and elution flow rate were selected to carry out experiments on the adsorption and desorption of methylated catechin. The experimental results showed that the best adsorption rate of methylated catechin was 1BV / h; the elution volume should be 4-5BV, and the elution flow rate was 2BV / h. The crystallization effect of methylated catechin under different conditions was also investigated from three factors: solution concentration, crystallization time and crystallization temperature. It can be seen from the experimental results that when the concentration of methylated catechin solution is 30%, the crystallization time is 4 days, and the crystallization temperature is 4 ℃, the purity, crystal yield and crystal weight of methylated catechin are the best.

In this paper, the extraction technology of methylated catechins in clinical medicine under the Internet of things technology is preliminarily studied, and some experimental results are obtained, but there are still some deficiencies in this study. And many areas need to be improved:

crystallization temperature due to experimental conditions, can not choose more temperature to compare the effect of crystallization temperature on crystallization; the purity of methylated catechin is only about 95%, and there are impurities in the appearance color. Therefore, the extraction process optimization of methylated catechin needs to be further explored in the future.

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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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