Nutritional Health Function and Anti-aging Effect of Two Kinds of Tea on SD Rabbits

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Abstract: Tea is widely welcomed by the public due to its rich contents of tea polyphenols, amino acids, vitamins and other micronutrients that are beneficial to human body. It has many health functions such as cancer prevention and anti-aging, and has been widely studied and concerned by the life science in recent years. In order to scientifically evaluate the nutritional and health function and anti-aging effect of tea, this paper took the two kinds of tea, Lushan Tea of Jiangxi province and Qimen black tea of Fujian Province as examples, to explore their nutritional and health function and anti-aging effect on SD rabbits, in order to provide theoretical reference for studying the anti-aging and anti-aging effect of different tea leaves on human body. In this paper, 44 adult SD rabbits were selected as experimental research objects and divided into three groups according to different tea intake: the control group, the green tea group and the black tea group. Among them, according to different tea doses, they were further subdivided into G1, G2 of the green tea group and R1 and R2 of the black tea group. The experimental groups were in sequence :G1, G2, R1 and R2 as the experimental groups, with 8 SD rabbits each, and the remaining 12 rabbits as the experimental control group. The experiment mainly studied the effects of the two kinds of tea on SD rabbits' body weight, appetite, blood glucose, lipid, triglyceride content, red blood cell activity and serum MDA content, respectively. The results showed that the two kinds of tea had no obvious effect on the body weight and blood fat of SD rabbits, but had the effect of increasing appetite and quenching thirst. Both kinds of tea can reduce blood glucose and lipid peroxidation, improve red blood cell activity, and have anti-oxidation and anti-aging effects, but green tea has stronger hypoglycemic function because it contains more tea polyphenols.

1. The Introduction

1.1. Background and Significance

Tea has now developed into one of the world's three major beverages, because of its low sodium,

low quantity of heat, do not contain sugar and contains rich tea polyphenols, amino acids, vitamins, and other organic trace elements, have long been popular with people, especially on a hot summer day, drinking tea can have the effect of heat-clearing and detoxifying and fall hematic fat, for human cancer anti-cancer, immunity and anti-oxidation anti-aging have good help. In addition, the by-products derived from tea can be used as feed for breeding production, and its nutritional and medicinal ingredients can improve the production performance of livestock and poultry. However, many people have a wrong idea about drinking tea, believing that the more tea you drink, the better, and the more beneficial it is to your health. In fact, tea should also pay attention to scientific nature, only the correct and appropriate intake of nutrients in tea in order to make the body get the maximum degree of absorption and help.

SD rabbits are often used in relevant experiments in the field of life sciences because they are very similar to us in function, structure, metabolism and disease type. In order to explore the nutritional health function and anti-aging effect of tea leaves on human body, SD rabbits were selected as the research object in this paper. Through experiments, the nutritional health function and anti-aging effect of two kinds of tea leaves on SD rabbits were investigated, analyzed and compared. The topic of this paper is based on the background that people pay more and more attention to their own health problems, so it is of great social practical significance and research value.

1.2. Related Work

In recent years, with the improvement of people's living quality and health conditions, more and more studies have been conducted on the effects of tea on human nutrition and health care and anti-aging. Unno Keiko pointed out that since aging is the most important risk factor for dementia, measures to slow the onset of aging in the brain are an important strategy to prevent dementia, and the accumulation of oxidative damage has long been thought to be a major cause of aging. Catechin in green tea (GTC) has strong antioxidant activity, and GTC intake can inhibit oxidative damage, brain atrophy and cognitive decline in aging mice. Age-related cognitive decline was significantly suppressed in middle-aged mice when green tea catechins were started. Therefore, middle-aged people can inhibit brain aging by taking GTC. In addition, under different circumstances, people are subject to various kinds of stress. In experimental animals exposed to chronic and psychosocial stress, the brain ages faster and lives shorter [1-2].Theanine is an amino acid found in green tea that is known to inhibit stress-induced aging. Therefore, drinking several cups of green tea every day can reduce stress and slow down the aging caused by stress [3].In addition, Wang Zhen and Liu An et al have also stated that excessive UV radiation will cause skin photoaging, of which the biological effect of UVB is the most obvious. Photoaging of the skin results in a variety of clinical and histological changes of the skin, including decreased collagen, hardened skin, thinning of the cortex, pigmentation, etc., and a variety of skin-related diseases such as solar dermatitis. Tea, a well-known health drink, has been shown to have an anti-aging effect on the skin. They show that tea extracts can prevent uV-induced skin photoaging symptoms by inhibiting MAPK phosphorylation [4]. Based on the research results of predecessors, this paper takes SD rabbits with similar structure and performance to human body as the research object, and through the tea water intake experiment of SD rabbits, the changes of body function of SD rabbits are observed, so as to prove the health and medical efficacy of tea.

1.3. Innovation Points of this Paper

The innovation points of this paper are mainly reflected in the following aspects :(1) by analyzing and comparing the nutritional health function and anti-aging effect of two different tea

leaves on SD rabbits, so as to provide theoretical basis for studying the effect of different tea leaves on human body; (2) The experimental steps and methods are reasonable and clear, with strong logic, clear experimental data sources, and strict structure of the whole paper, with high reference value.

2. Application of Tea on Nutritional Health Function and Anti-Aging Effect of SD Rabbits

2.1. Main Classification and Efficacy of Tea

(1) Main classification

Tea originated in China and can be traced back to the shennong Era in the primitive society. In the early stage, tea was used as a sacrificial offering. However, with the development of history, tea was gradually used as a dish, medicine and drink. Up to now, tea has become one of the three non-alcoholic beverages in the world, playing a pivotal role in the world [5-6]. China's tea has a long history and a wide variety. After thousands of years of development and evolution, China's tea varieties have reached hundreds of varieties, which are mainly divided into the following six tea lines:

Green tea: One of the most common tea varieties in China, belonging to non-fermented tea, common green tea is: Lushan Yunwu Tea, West Lake Longjing tea, Biluochun, Huangshan Maofeng, etc.;

Black tea: Fully fermented tea is mainly distributed in Guangdong, Fujian and Jiangxi provinces of China, and there are three types of small black tea, Gongfu black tea, and Fugao black tea.

Oolong tea: Also known as green tea, it is a kind of tea between green tea and black tea. It belongs to semi-fermentation. In the taste, it has both the freshness and intensity of green tea and the sweetness of black tea.

Yellow tea: It belongs to micro-fermentation tea. In the process of making tea, it is made by pouring yellow tea into piles. It includes three kinds of yellow bud tea, yellow small tea and yellow big tea.

Dark tea: it belongs to post-fermentation tea, and its processing is relatively rough. It is formed by accumulation and fermentation for a long time, with dark brown color. The main varieties include yunnan Pu 'er tea, Hunan dark tea, Hubei old green tea, Sichuan border tea, etc.

White tea: belong to tea of mild ferment, do not fry when processing, knead, rely on gentle fire to dry completely, so the white fuzz on tea leaf was retained completely and come down and make its appear white. The main producing areas are the northern part of Fujian and Ningbo of Zhejiang, and a few places in Guizhou are also planted, representing tea: Pekoe silver needle, white peony, etc. [7-8].

The above types are divided according to the degree of roasting during processing. In addition, according to the season, Chinese tea can be divided into spring tea, summer tea, autumn tea and winter tea. According to the reprocessing can also be divided into: jasmine tea, such as jasmine tea, rose tea; Pressed tea, such as black brick, fuzhuan, square tea; Fruit tea, such as lemon tea, kiwi tea, litchi black tea; Extract tea, such as instant tea, concentrated tea; Tea drinks, such as iced black tea and milk tea; Medical health tea, such as weight loss tea, eucommia ulmoides tea; There is also a kind of matcha that is ground tea leaves into powder, which is generally ground with green tea [9].

(2) Efficacy

According to relevant data, tea contains more than 450 organic chemical components and trace elements, among which tea polyphenols, amino acids, catechins, theanine, vitamins and minerals such as potassium, calcium, magnesium and manganese have great nutritional value and function for human body [10]. In ancient times, our ancestors used tea as medicine to treat diseases, and today tea is more widely used in health care and medicine. Experts study showed that the tea catechins and theanine could reduce the cholesterol in the blood, inhibit blood pressure and platelet

coagulation, potassium magnesium calcium, manganese and other minerals can promote human body blood, eliminate, prevent hypertension disease, antioxidant and anti-aging, enhance immunity, etc, and amino acids and vitamins is human body essential nutrients. Therefore, tea is of great help to human health, and long-term drinking of tea can prolong life [11].

2.2. Introduction of SD Rabbits

Rabbit is a kind of the wild rabbits after domesticated breeding cultivated, belong to type of animals, because of its physical characteristics, function, metabolism and disease types and humans are very similar, so is often used in biomedical fields such as clinical experiments, in addition to the rabbit and rat also is often used to dissect the experiment research of human disease, because the volume is too small, but the rats sometimes experimental data exist error is too large, so the rabbit experimental application more than[12-13] .

Rabbits can be divided into small rabbits, medium rabbits, large rabbits and giant rabbits according to their body size, and long-haired rabbits and short-haired rabbits according to their hair length.Rabbit nature quiet, easy taming and breeding management, establishment of animal model for experiments is more convenient, and it is sensitive to many viruses and bacteria, very suitable for a variety of microbiology research, it usually respond to external stimuli and the people are very similar, so choose the rabbit as model animals, for improving the precision and effect of experiment is good [14].

2.3. Manifestation of Nutritional Health Function and Anti-Aging Effect of Tea Polyphenols on SD Rabbits

Tea polyphenols is the main ingredient in tea, studies have shown that tea polyphenols with antioxidant, anti-aging, and prevent the pharmacological effects, such as radiation in order to support the nutrition health care function of tea polyphenols and anti-aging effect, we chose 15 adult male SD rats experiment, divided into green tea, black tea group and the control group, 5 only, shut in a cage raising two weeks respectively, to the experimental SD rats fed during different concentrations of tea and tea processed feed, the control group in the case of not adding tea an equal amount of water and feed. Two weeks later, SD rabbits were dissected and treated to observe the situation.

Through the analysis and comparison of various components in the blood of the TWO groups of SD rabbits and the examination of their brain tissue, it was found that the SD rabbits in the experimental group who drank tea water and tea feed, their body weight decreased significantly within two weeks, and their appetite increased compared with before, while their sugar index and phospholipid content in the blood decreased compared with before. In the control group, there were no significant changes in body weight, blood glucose and blood lipid in SD rabbits without tea. Therefore, polyphenols in tea can effectively reduce the sugar content and fat content in the blood of SD rabbits, enhance their cell activity, and achieve antioxidant and anti-aging functions.

3. Detection Experiment of Nutritional Health Function and Anti-Aging Effect of Two Kinds of Tea on SD Rabbits

To study and analysis of different varieties of tea on the SD rats nutrition health care function and the effect of anti-aging, science evaluation tea function to human body health care efficacy, this article will to cloud of jiangxi and fujian tea qimen county as an example, the two different tea black tea by observing different tea intake after SD rabbit body functions to detect changes of different tea to human health care efficacy whether there is a difference.

3.1. Selection and Grouping of Experimental Animals

Choose 44 adult SD rats, the male female unlimited, weight control in 2-3 kg, according to the different tea intake will be randomly divided into control group, green tea and black tea group three groups, and according to the different concentration of tea, green tea and black tea group each subdivided into two groups, the final control group 12, green tea in G1 group 8, G2 group 8, black tea in the R1 group 8, R2 group of eight. The SD rabbits in each group were kept in cages for 1 month, during which the SD rabbits in the control group were fed with ordinary feed and drinking water, the SD rabbits in the green tea group were fed with different concentrations of green tea and processed tea feed, and the SD rabbits in the black tea group were fed with different concentrations of black tea and processed tea feed. All groups had the same amount of water and feed. After feeding for 1 month, blood was collected from the artery of SD rabbits in each group and anticoagulated to make serum samples.

3.2. Preparation of Tea Samples and Tea Feed

The green tea and black tea required for this experiment were purchased from regular tea shops in the market. The green tea was selected from Yunwu Tea in Lushan, Jiangxi, and the black tea was selected from Qimen Black tea in Fujian.

Tea feed preparation: First, tea is prepared according to the normal daily drinking water amount of SD rabbits, which is obtained by boiling distillation at the dose standard of 0.5% and 1% respectively every day. Secondly, the tea feed was prepared according to the normal daily intake of SD rabbits. After grinding dry green tea and dry black tea into powder, the mixture was added into the ordinary rabbit feed at 0.5% and 1% of the dose each day, respectively. All SD rabbits in all groups adopted free foraging.

3.3. Experimental Reagents and Equipment

The reagents used in this experiment include: enzyme reagent, SOD and MDA kit, instruments and equipment include: confocal microscope, weight scale, thermostatic water bath box.

3.4. Experimental Steps and Methods

First, after all SD rabbits were divided into groups, they were numbered and weighed one by one at the beginning of the experiment, and relevant data were recorded. Then they were put into cages for breeding. Weight was measured every week for 1 month after feeding, before each meal.

Second, they were fed continuously for 1 month, during which the control group was normally fed with ordinary drinking water and rabbit feed. Groups G1 and R1 were fed with tea and tea feed with a concentration of 0.5%, and groups G2 and R2 with tea and tea feed with a concentration of 1%. The average feed and water consumption per rabbit on that day was measured and recorded.

Thirdly, after feeding for 1 month, a certain amount of blood was taken from the artery of SD rabbits in each group to make serum samples, and then the changes of phospholipid, RBC superoxide dismutase activity, lipid peroxides, glucose and triglycerides in the serum were measured and observed.

Fourth, the SD rabbits were subjected to craniotomy, the left brain was taken for pathological sections, and the nerve fiber structure of brain cells was observed by confocal microscope.

Fifthly, all data and materials should be summarized and sorted out after the experiment.

3.5. Experimental Research Content

In this experiment, we mainly studied the effects of tea on the weight of SD rabbits. Effect of tea leaves on appetite of SD rabbits; Effects of tea on blood glucose, blood lipid and triglyceride in SD rabbits; Effect of tea on erythrocyte activity and SERUM MDA in SD rabbits. The specific experimental results will be introduced in detail in the fourth part of this paper.

3.6. Experimental Data Processing

All data were statistically processed with SPSS 22.0 statistical analysis software. The test indicators were expressed as mean $\pm$ standard deviation (X $\pm$s). The formulas involved had variance and T test, such as (1) and (2).

$$s^2 = \frac{(x_1 - M)^2 + (x_2 - M)^2 + (x_3 - M)^2 + \ldots + (x_n - M)^2}{n} \quad (1)$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\dfrac{\sigma_{x_1}^2 + \sigma_{x_2}^2 - 2\gamma\sigma_{x_1}\sigma_{x_2}}{n-1}}} \quad (2)$$

4. Analysis of the Detection Results of the Nutritional Health Function and Anti-Aging Effect of the Two Kinds of Tea on SD Rabbits

In the third part of this paper, we took Jiangxi Yunwu tea and Fujian Qimen black tea as examples, and took SD rabbits as the object to carry out the detection experiment of the nutritional and health function and anti-aging effect of the two kinds of tea on SD rabbits. In this chapter, we will conduct specific analysis and discussion on the experimental detection results.

4.1. Influence of Two Kinds of Tea on the Weight of SD Rabbits

According to the experimental results, the average weight of 12 SD rabbits in the control group before the experiment was 2.34kg. During the experiment, the average weight in the first week was 2.12kg, the second week was 2.10kg, the third week was 2.13kg, and the fourth week was 2.0kg. Although the weight of SD rabbits in the control group decreased during the experiment, the overall change was not significant. In the experimental group, the weight of SD rabbits in the green tea group and the black tea group also decreased, but the weight was restored after the experiment. In general, the weight change of SD rabbits in the experimental group was not significantly different from that in the control group (P>0.05).

4.2. Effects of Two Kinds of Tea on the Appetite of SD Rabbits

According to the observation of the whole experiment process, we found that the intake of feed of SD rabbits in the green tea group and the black tea group was higher than that in the control group. Moreover, with the increase of tea concentration, the daily intake of SD rabbits increased more significantly, while the amount of water in the experimental group was lower than that in the

control group. The specific situation is shown in Table 1.

Table 1. Effects of two kinds of tea on the appetite of SD rabbits

Groups	Tea content(%)	Number of SD rabbit	Amount of feed consumption(g/one)	Amount of drink consumption(g/one)
G_1 group	0.5	8	28.9 ± 5.3	38.62 ± 6.9
G_2 group	1	8	29.5 ± 7.5	35.1 ± 7.1
R_1 group	0.5	8	28.4 ± 7.4	37.62 ± 7.9
R_2 group	1	8	29.9 ± 7.3	35.2 ± 7.5
Control group	0	12	24.3 ± 3.2	36.7 ± 4.4

As shown in Table 1, the daily intake of each SD rabbit in the green tea group was about 28-29g, and the daily water intake was about 35-38g, including 35.1 ± 7.1 in the G2 group and 38.62 ± 6.9 in the G1 group. The daily water intake of the G2 group was much less than that of the G1 group, and even less than that of the control group. Similarly, the daily intake of the black tea group was higher than that of the control group, and the daily intake of the R2 group was less than that of the R1 group and the control group. This indicates that both kinds of tea can improve the appetite of SD rabbits, while the amount of water the SD rabbits drink decreases with the increase of tea concentration, indicating that tea also has the effect of quenching thirst.

4.3. Effects of Tea on Blood Glucose, Blood Lipid and Triglyceride in SD Rabbits

Through the study and observation of serum samples of SD rabbits, the blood glucose, lipid and triglyceride content of SD rabbits in each experimental group and control group were shown in Figure 1 and Figure 2.
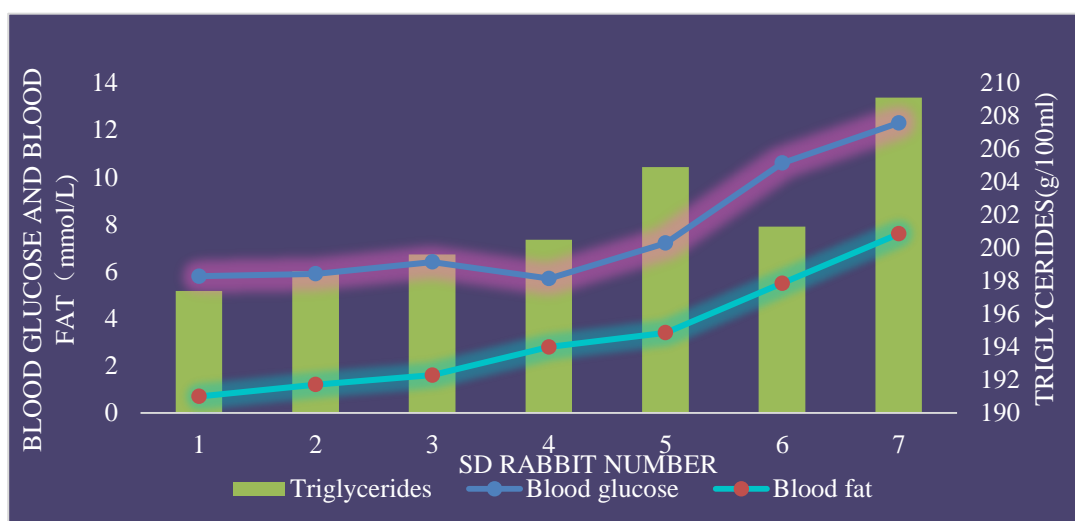

Figure 1. Effects of green tea on blood glucose, blood fat and triglyceride in SD rabbits
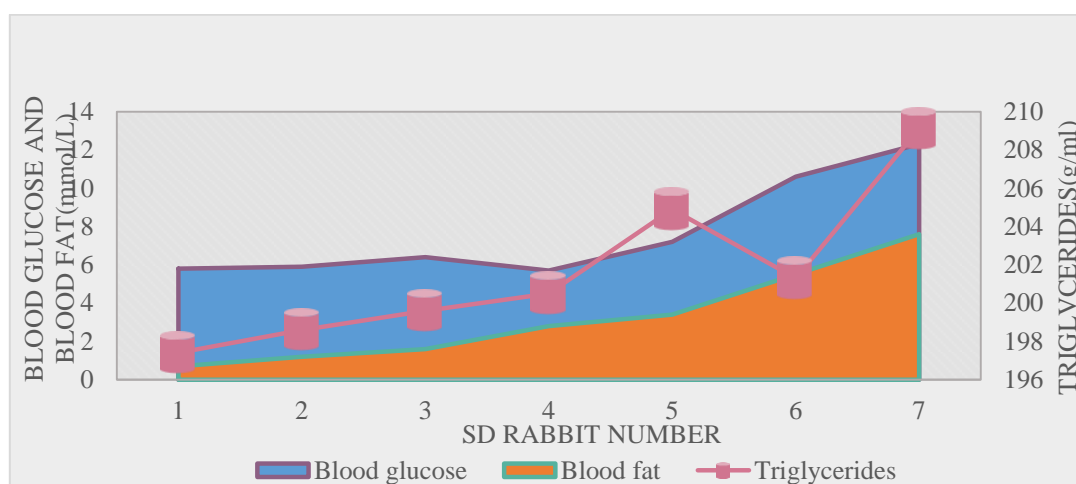
Figure 2. Effects of black tea on blood glucose, lipid and triglyceride in SD rabbits

From Figure 1 and Figure 2, we can see that the blood glucose content of each experimental group is significantly different from that of the control group, P<0.05, so the difference is statistically significant. In Figure 1, the serum triglyceride content of G1 group and G2 group was significantly lower than that of the control group, while in Figure 2, black tea had no significant effect on the triglyceride content of SD rabbits. The two kinds of tea had no significant effect on the lipid content of SD rabbits. This indicates that both green tea and black tea have the effect of lowering blood glucose, and green tea has a better effect of lowering blood glucose than black tea because it contains more tea polyphenols, but both tea leaves have no obvious effect on blood lipid.

4.4. Effects of the Two Kinds of Tea on Red Blood Cell Activity and Serum MDA in SD Rabbits

In order to better analysis and the experiments in different tea before and after the experiment of SD rabbit red blood cell activity and the content of MDA in serum of change, we will test before and after the experiment, two weeks after 1 month of SD rats serum MDA content in the statistical comparison, the results as shown in Table 2 and Figure 3, at the same time, the green tea and black tea group of SD rats RBC SOD content has carried on the statistical analysis, the result is shown in Figure 4.

Table 2. Effects of two kinds of tea on erythrocyte activity and serum MDA in SD rabbits

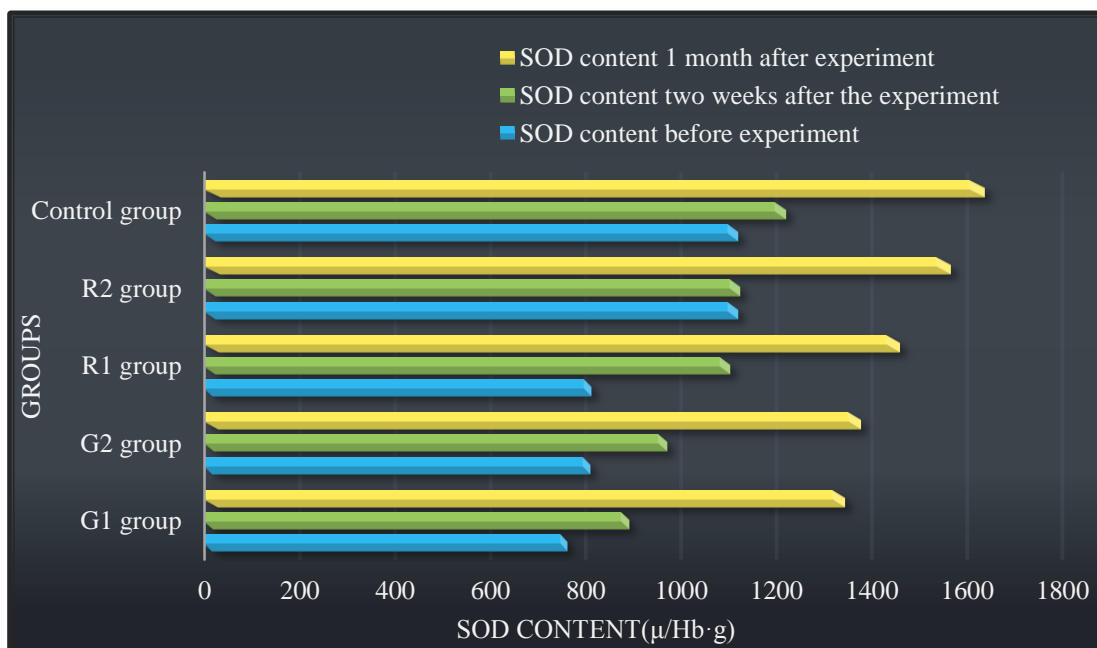| Groups	Tea content(%)	Number of SD rabbit	MDA content before experiment	MDA content two weeks after the experiment	MDA content 1 month after experiment
G_1 group	0.5	8	5.44±1.02	5.43±1.70	5.13±0.89
G_2 group	1	8	5.34±1.45	7.40±1.36	9.42±1.06
R_1 group	0.5	8	5.54±1.32	6.24±1.54	6.49±1.72
R_2 group	1	8	5.68±1.46	5.49±1.68	7.51±1.38
Control group	0	12	5.48±1.15	6.03±1.15	5.41±1.46

Figure 3.Effects of two kinds of tea on erythrocyte activity and SERUM MDA in SD rabbits

As shown in the above table and figure, there was no significant difference in MDA content between the green tea group and the black tea group before the experiment, but there was significant difference two weeks after the experiment ($P<0.05$), and there was extremely significant difference one month after the experiment ($P< 0.01$). With the increase of tea concentration, the serum MDA content in the experimental group and the control group increased significantly. The experimental results showed that both kinds of tea had the effect of reducing serum lipid peroxidation in SD rabbits.
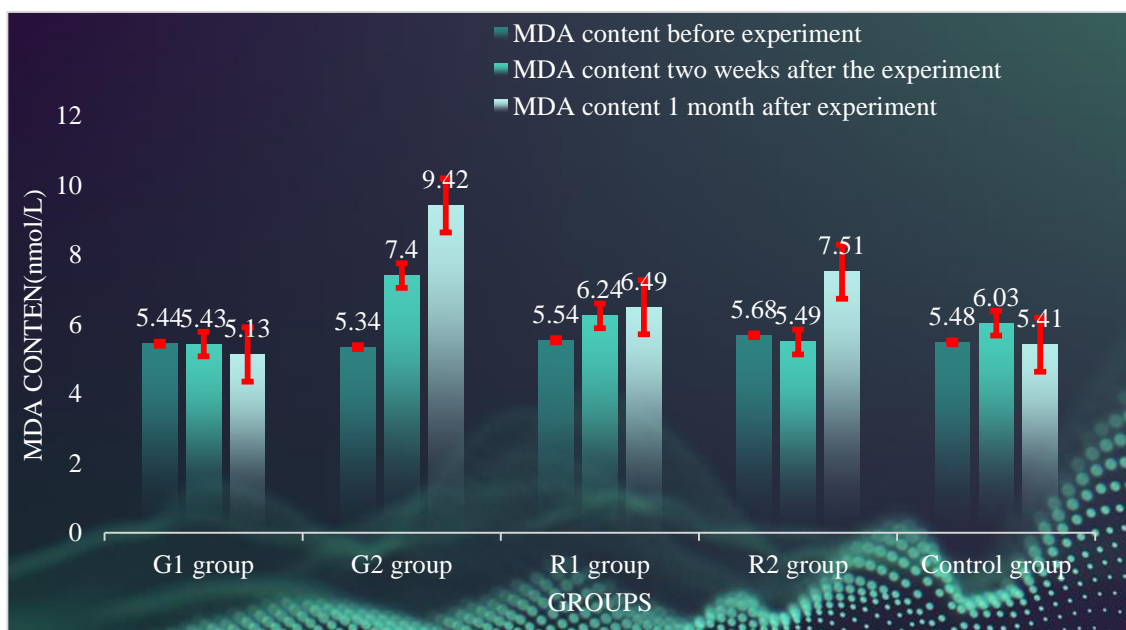

Figure 4. Influence of two kinds of tea on SOD activity in RED blood cells of SD rabbits

As shown in Figure 4, compared with the control group, SOD activity in red blood cells of SD rabbits in the experimental group was increased in all four groups, except that the difference between the Black tea group R1 group and the control group was not significant ($P<0.05$), and the difference between the other groups and the control group was statistically significant ($P<0.05$). This indicates that both kinds of tea can increase the activity of red blood cells in SD rabbits.

To sum up, cloud tea from Lushan, Jiangxi and Qimen black tea from Fujian had no obvious effect on the weight and lipid content of SD rabbits, but they could enhance the appetite of SD rabbits and help them quench their thirst. Can reduce the blood sugar content, has the antioxidant ability; It can increase the activity of red blood cells in SD rabbits, improve the content of serum MDA, and thus reduce the serum lipid peroxidation.

5. Conclusion

With the development of social economy and the improvement of people's living standard, more and more people begin to pay attention to their own health problems and pursue a healthy lifestyle. As a kind of health drink, tea is rich in various minerals and nutrients needed by human body. In recent years, tea has been sought after by more and more people. It has anti-oxidation, anti-aging, blood pressure and anti-cancer and other nutritional health effects.

To explore different tea nutrition health care function and anti-aging effect to human body, scientific and reasonable evaluation of the effect of tea, this study chose and metabolism of human body function mechanism and structure, and so on are very similar with rats as experimental object, based on cloud of jiangxi and fujian tea qiinen black tea tea samples, the two kinds of tea of SD rats nutrition health care function and anti-aging effect of experiment.

The experimental results of this study showed that the two kinds of tea had no obvious effect on the body weight and blood fat of SD rabbits, but they could improve the appetite of SD rabbits and help them quench their thirst. In addition, both kinds of tea can reduce blood glucose, lipid peroxidation and increase the activity of red blood cells in SD rabbits. Among them, green tea contains more abundant tea polyphenols, which has a more obvious effect on blood glucose reduction in SD rabbits. The results of the study show that tea has an anti-aging and life-extending effect, which is beyond doubt.

Funding

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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