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PRECLINICAL EVALUATION OF HYDROALCOHOLIC EXTRACT OF *PANAX GINSENG* ROOT ON CARDIOVASCULAR ACTIVITY

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ABSTRACT

Panax ginseng, one of the most well-known herbal remedies. Ginsenosides are *P. ginseng's* major active components, which were demonstrated to have a wide range of medicinal effects. Many studies indicate that ginsenosides provide a range of activities in both pathologic and physiological conditions related to cardiovascular disease.

Albino Wister rats (150-200 gm) were sacrificed and the heart was removed along with the aorta as rapidly as possible and the tissue was plunged into an ice-cold Krebs Henseleit solution. The heart had blood flow at a constant pressure of 90 cm of water with Krebs Henseleit solution, maintained at 37ºC and Ph 7.4. The test drug was injected (0.1 ml) and the heart rate and the contractions of the heart for a minute were recorded.

The droplet was shown to diminish as the dose of Ach was raised when it was administered at various doses of 0.1, 0.2, 0.4, and 0.8 ml from a 100 g/ml stock solution. 72, 66, 51, and 24 drops of the appropriate dosages of Ach were obtained, showing the typical bradycardia and hyperpolarization of the SA nodal cell of Ach. After adding 0.1, 0.2, 0.4, and 0.8 ml of a 1 mg/ml stock solution to the heart and counting the droplets, the appropriate doses of 82, 86, 90, and 89 droplets were produced. The result of this experiment reveals, ginseng is having cardio stimulant activity within a limit which may act as a cardio tonic also, but after confirming the same experiments on hypodynamic heart.

Keywords: *Panax ginseng*, cardiovascular disease (CVD), Hydroalcoholic extract, Heart rate

INTRODUCTION

The 400 million indigenous communities worldwide who suffer from cardiovascular disease (CVD) are at serious risk. The World Health Organization estimates that cardiovascular disease (CVD) caused 31% of all fatalities, with heart attacks and strokes accounting for 85% of those deaths. Although typically considered a disease in developed countries, its incidence is increasing in emerging nations as well **[1, 2, 3]**. In India, coronary artery disease accounts for 11% of all deaths in urban regions and 5% of deaths in rural areas. Chronic diseases are proliferating fast across the globe. By 2020 this will be the cause of most deaths worldwide, with around 71% of deaths being caused by CHD. Using the research conducted worldwide, approximately 60% of the deaths from cardiovascular diseases will be in the developed world. Although India and China have fewer cardiovascular diseases compared to other economically developed countries in the world **[4]**.

The typical cause of CVD is vascular dysfunction, which can be brought on by factors including atherosclerosis, thrombosis, or high blood pressure and affects organ function **[5]**. Most notably, the heart and brain can be affected, as in myocardial infarction and stroke, respectively. In the past few decades, major improvements have been made in treating some types of CVD. However, there is an urgent need for new treatment options for all forms of CVD. Additionally, improving diagnosis is essential because by spotting the disease in its earliest stages, therapy could shift its focus from treatment to prevention **[6]**. CVD is the principal reason for morbidity and mortality in millions of people around the world, which includes a variety of diseases such as peripheral vascular disease, coronary artery disease, heart failure, dyslipidemias, and hypertension **[7, 8]**. These illnesses frequently affect people of various racial backgrounds, genders, and ages. Myocardial necrosis following infarction causes heart failure, myocardial rupture, or arrhythmias **[8]**. Myocardial infarction and sudden death continue to remain one of the leading causes of mortality and morbidity in many countries, despite vast advances in the past five decades. In addition, risk factors such as cigarette smoking, elevated low-density lipoprotein cholesterol, low levels of high-density

lipoprotein cholesterol, diabetes mellitus, and hypertension are the primary causes of CVD **[9]**. According to recent investigations, atherosclerosis and coronary artery disease can both cause vascular inflammation **[10]**.

The name PANAX means “all healing” and stemmed from the traditional confidence that ginseng can cure all illnesses of the

human body. The main active components in *p.ginseng* are ginsenosides, which are triterpene saponins. Most research on the pharmacological and medicinal functions of p. *ginseng* has focused on ginsenosides. The root of *Panax ginseng* was used in China to treat diseases for more than 2,000 years **[11]**. In addition, the ginseng root has an immunomodulating and restorative activity, which is due to the presence in its composition of a large number of biologically active substances (triterpene glycosides, mucus, resins, and vitamins B1, B2, C, choline, bitter, essential) and (fatty oils, pectin's, carbohydrates and others) **[12]**. Multiple effects of ginseng, such as antitumor, anti-inflammatory, antiallergic, antioxidative, antidiabetic, and antihypertensive have been confirmed by modern medicine **[13]**. Now a day, the clinical use of ginseng has increased dramatically, both in terms of the diseases treated and the geographical area involved. For example, it has been reported that the most commonly used herbal drugs for treating cardiovascular diseases in America and Canada **[14]**. Currently, ginseng's role in protecting the heart is a focus of research in medical science, and the mechanism of action is increasingly being uncovered. The most popular ginsengs are American ginseng (*P. quinquefolium* L.), Chinese ginseng (*P. notoginseng*), and Korean red ginseng *(P. ginseng* Meyer). Despite this lengthy history, the mechanism underlying the plant's medical efficacy wasn't discovered until the active ingredients (ginsenosides) were isolated starting in 1963 **[11, 14]**. Since then, a lot of work has gone into analyzing each ginsenoside's role and illuminating its chemical mechanism. This is reflected in the exploding number of PubMed-cited publications on ginseng and ginsenosides since 1975. Instead of utilizing whole ginseng roots, research currently focuses on the study of purified individual ginsenosides **[15-20]**. Due to the differences in their structural makeup, each ginsenoside may have a unique pharmacologic action and/or mechanism. As of 2012, about 40 ginsenosides had been found, and the various techniques for separation and analysis have received good reviews **[21]**. The most commonly studied ginsenosides are Rb_1, Rg_1, Rg_3, Re, and Rd. A detailed review of the anti-amnestic and anti-aging effects and action mechanisms of Rb_1 and Rg_1 has been published in **[20]**. Some studies have reviewed ginseng's effects on the cardiovascular system. According to animal research, ginsenosides can have biphasic effects on blood pressure, with blood pressure falling at the onset of activity and then rising **[22]**. Rats and rabbits' systemic blood pressure was reported to be lower after ingesting *Panax notoginseng* preparations by Lei and Chiou (1986) **[23]**. Numerous in vivo

investigations have indicated that ginseng may reduce blood pressure without regard to dose **[24]**.

Some people take *Panax ginseng* as a general tonic to boost well-being and as a stress reliever. Different types of ginseng are there. East Asian ginseng (from Chinese and Korean sources) is used for unclear thinking, diabetes, and male erectile dysfunction. American ginseng was used for diabetes and for reducing the risk of the common cold and flu. Koreans have traditionally used p. ginseng roots and root extracts to increase physical strength and vigor, prevent aging, and revive the body and mind. A new pharmacological concept of the tonic effect of ginseng has arisen **[25]**. In this project, there is an attempt to find out the activity of the hydroalcoholic extract of *Panax ginseng* root on heart rate.

MATERIALS AND METHODS:

Collection of plant material:

The N.P. Dutta and Sons company in Kolkata provided dried ginseng roots with preservation.

Animals:

Throughout the experiment, albino Wister rats weighing 50–100gm will be used. Animals will be kept in an animal house under the usual conditions of 12-hour's light and dark circles.

Extraction Process:

The roots were manually ground in a hand grinder, and the coarse powder was then put through a cold percolation process using a 70% hydro-ethanolic combination. The resulting extract was then dried by open-air evaporation.

Stock solution:

The stock solution was prepared to contain 0.1mg/ml of the drug and 1ml/100gm of the body weight of the animal was given to these animals.

Method: [26, 27]

Before beginning the experiment, Langendorf's apparatus is set and is ensured that the perfusion system is in good condition. Heparin (300 IU, i. p) is injected and after 20 minutes, anesthetizes the rat with pentobarbitone sodium (45 mg/kg, given intraperitoneally). Then albino wistar rats were sacrificed by cervical dislocation. Thorax opened immediately, expose and the heart was removed along with the aorta as rapidly as possible and the tissue was plunged into ice-cold Krebs Henseleit solution. The heart was cannulated through the aorta using an artery cannula and the heart was mounted on Langendorff's apparatus by securing firmly in place with button thread.

The heart was pumped with blood at a constant pressure of 90 cm of water with Krebs Henseleit solution, maintained at 37ºC and pH 7.4. The reservoir maintained a perfusion rate of 5 ml/minute and saturated the perfusion solution with oxygen bubbles at a constant and slow pace. Attach a heart

clip was completed with a light thread to the tip of the ventricle. The thread was located around a pulley about 4 mm vertically below the heart. The normal coronary output was recorded by counting the drops of the fluid leaving the heart rate. The test drug was injected (0.1 ml) and the heart rate and the contractions of the heart for a minute were recorded

RESULT AND DISCUSSION:

In the heart apparatus, the droplet was maintained at 80, which means 80 drops were poured per minute. Then the isolated heart was mounted and once again the droplet was fixed at 80/min. 0.1, 0.2, 0.4, and 0.8 ml of Ach from 100µg/ml stock solution was infused and the droplet was found to decrease as the dose increased. 72, 66, 51, and 24 drops were obtained in respective doses of Ach, from which the hyperpolarization of SA nodal cells and bradycardia was evident, which is the characteristic of Ach **(Table 1)**.

The arrested heart was reverted by using adrenaline 0.2 ml (stock solution 100µg/ml) and then maintained with a salt solution for 5 min. 10 mg of *Panax ginseng* extract was dissolved in 10 ml of distilled water to get 1mg/ml stock solution from that 0.1, 0.2, 0.4, and 0.8 ml were added in the heart and the droplets were counted 82, 86, 90, 89 droplets were obtained in respective doses, from the above finding it was evident the cardio stimulant activity of *P. ginseng.* In 0.4 ml it has given the maximal response whereas the keep increasing the doses stand as supra maximal response. After seeing the outcome of this experiment, it is clear, ginseng is having cardio stimulant activity within a limit which may act as a cardio tonic also, but after confirming the same experiments on hypodynamic heart.

Table 1: shows the results of the acetylcholine dose and droplets count

Sl. No	Dose of Ach	Droplets count
1	0.1	72
2	0.2	66
3	0.4	51
4	0.8	24

Table 2: shows the results of P. Ginseng extract dosage and droplets count

Sl. No	P. Ginseng extract dosage	Droplets count
1	0.1	82
2	0.2	86
3	0.4	90
4	0.8	89

CONCLUSION:

The dried roots of *P. ginseng* were collected and hand grinded and using a 70% hydro-ethanolic combination, the coarse powder was treated to cold percolation, and the resulting extract was dried by open-air evaporation. Albino wistar rats around 150-200 gm were applied for this study. Then the isolated heart was mounted and once again the droplet was fixed at 80/min. 0.1, 0.2, 0.4,

and 0.8 ml of Ach from 100µg/ml stock solution was infused and the droplet was found to decrease as the dose increased. 72, 66, 51, and 24 drops were obtained in respective doses of Ach, from which the hyperpolarization of SA nodal cells and bradycardia was evident, which is the characteristic of Ach.

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