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Screening of Volatile Constituents of *N. sativa* on Calcium Depleted Heart Model

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ABSTRACT

The number of deaths from cardiovascular disorders is rising every year. *Nigella sativa*, one of the accessible natural plants, has a broad range of pharmacological effects. The *Nigella sativa* seeds were removed, cleaned, and preserved in order to research the effects of the plant on the cardiovascular system. After being ground into a fine powder, the seeds were used to extract the volatile oil from the seeds using the steam distillation process. The hypodynamic model was used after the rat's heart was removed. Using the standard kreb's hanselet salt solution to mount the isolated heart, a typical graph was produced. As the calcium concentration was reduced, the graph's negative tropic activity became apparent. When *N. sativa* was administered it has produced additional negative tropic effect on hypodynamic heart. At 0.1 ml produced negative tropic effect and keeps on decreasing as the dose increases by 0.2, 0.4, 0.8ml in dose dependent manner.

***Keywords*-** Rhododendron arboretum, Peptic ulcers, NSAIDs, Herbal therapy, Phytochemical data.

I. INTRODUCTION

Cardiovascular diseases (CVDs) are a serious health burden that is becoming more and more common. They continue to be the principal global sources of illness and mortality. Herbal remedies are still used as an alternative to conventional medicine to treat a variety of illnesses, including CVDs.

One of the newly discovered herbs is *Nigella sativa*, which Hippocrates and Dioscorides both refer to as "melanthion" [1]. The annual herbaceous plant black cumin (*Nigella sativa* L.), belongs to the Ranunculaceae family. Lipase, a lipolytic enzyme found in black cumin seeds, is utilized extensively in food, cosmetics, and pharmaceutical products [2].

Numerous active substances, including 30–40% fixed oil, 0.5–1.5% essential oil, protein, and pharmacologically active substances such as thymoquinone, ditimoquinone, and nigellin, are present in *Nigella sativa*. Thymoquinone, which is present in Nigella sativa extracts, is thought to be able to inhibit both lipoxygenase and cyclooxygenase (COX), the two

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principal enzymes that can cause inflammation [3]. The volatile oil has been shown to contain 18.4-24% thymoquinone (T.Q.) and many monoterpenes such as p-cymene and α-pinene [4].

It has also been applied to help nursing moms produce more milk. It helps with digestion and parasite infections. It has been used to treat eczema, sores on the skin and has wound healing activity [5]. It has been observed that the seeds' various raw and purified components have a variety of pharmacologic effects, including antihistaminic[6], antihypertensive[7], hypoglycemic[8], anti-inflammatory [9], anti-neoplastic[10], antibacterial [11], antioxidant [12], antifertility [13] etc.

The effect of *Nigella sativa's* volatile oil on the heart in a hypodynamic model for cardiovascular illnesses, notably congestive heart failure, was therefore believed to be intriguing to investigate.

II. MATERIALS AND METHODODLOGY

Collection of plant seeds:

The seeds of *N. sativa* were gathered by a nearby market in Chakdaha. First, the seeds were properly cleansed to ensure that no dirt or dust particles remained and then dried at room temperature.

Preparation of extract:

The *N. sativa* seeds were ground into a fine powder using a mixer grinder. The oil was extracted from the powder using the steam distillation process, and it was then stored in a collection. [14]

Hypodynamic heart model:

Starling's law of the heart governs the myocardial contraction of a healthy heart. This law states that the force of systolic contraction is directly proportional to the length of the fibres during diastole. The law states that cardiac output (i.e. stroke volume) is directly proportional to venous return or venous pressure during diastole since the systolic contraction represents cardiac output and the fibre length in diastole indicates venous pressure. When the cardiac musculature disobeys this relationship, as in congestive heart failure, there will be a decrease in stroke volume (cardiac output), insufficient ventricle emptying during systole, and an increase in heart size as a result of blood still remaining in the heart at the conclusion of systole. The heart is referred to as having a hypodynamic heart when it is unable to contract to physiological normality.

Hypodynamic hearts can be created experimentally by perfusing the heart with ringer solution having less calcium, as the bivalent ion is required for myocardial contraction. Male Albino wistar rat weighing 150-200gms were obtained from a CPCSEA-approved animal breeder and acclimatised in the NSCBIP animal house for 7 days prior to the experiment. The mice were fed normal food pellets and water on a 12-hour light/dark cycle. Set up an Albino wistar rat heart perfusion with normal Krebs-henseleit solution. Replace the perfusion fluid with modified Ringer, which contains only 1/4 the calcium chloride of standard Ringer. Take note of the shift in the cardiac recording pattern. When the heart is depressed markedly in presence of modified Ringer, administer $CaCl_2$ (0.1, 0.2, 0.4and 0.5ml) and *N sativa* (0.1, 0.2, 0.4 and 0.8 ml). Note the change in contractility. Fix the tracing and compare the responses of these drugs in normal and hypodynamic heart.

III. RESULT AND DISCUSSION

When the isolated heart was mounted by using normal krebs-henseilet salt solution, a normal graph was obtained, as the calcium concentration was depleted the negative tropic activity was found in the graph. Additional bolus administration of $CaCl_2$ was able to revert the situation. The tropic activity was modified and shown positive inotropic and chronotropic activity by the bolus administration of Calcium. When *N. sativa* was administered it has produce additional negative tropic effect on hypodynamic heart. At 0.1 ml produced negative tropic effect and keeps on decreasing as the dose increases by 0.2, 0.4, 0.8 ml in dose dependent manner.

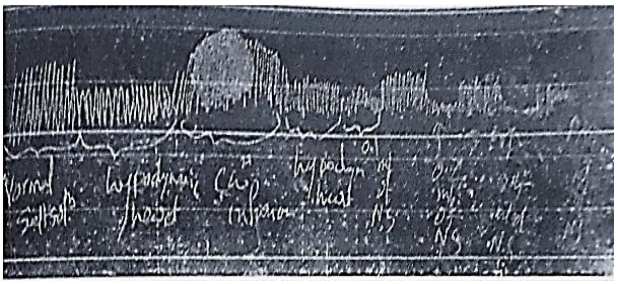

Fig: Effect of volatile constituents of *N. sativa* on calcium depleted heart model

IV. CONCLUSION

The *N. sativa* seeds were removed and finely powdered. By employing the steam distillation procedure, the volatile oil from the powder was removed, collected, and stored. The rat's heart was removed, and the hypodynamic model was conducted. A normal graph was produced after the isolated heart was mounted using a standard Kreb-Hanseleit salt solution, and as the calcium concentration plummeted, negative tropic activity was found in the graph. *N. sativa* administration resulted in additional adverse effects on the hypodynamic heart. Negative tropic impact was established at 0.1 ml and continues to diminish as the dose increases by 0.2, 0.4, and 0.8 ml in a dose-dependent way.

Based on the aforementioned results, it can be concluded that volatile oil of *N.sativa* has a potent effect on the hypodynamic heart, decreasing inotropic and chronotropic activity in a dose-dependent way.

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