Journal of Pharmaceutical Research International

33(63A): 338-346, 2021; Article no.JPRI.77878
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Preparation and Free Radical Scavenging Activity of Mint and Green Tea Formulation

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i63A35640

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/77878

Original Research Article

Received 26 October 2021
Accepted 28 December 2021
Published 29 December 2021

ABSTRACT

Background: Antioxidants are an essential defence mechanism to protect our body against free radical damage. They balance the production of free radicals and detoxify them when in excess. Green tea manufactured from dried leaves of camellia sinensis. Mint belongs to the genus mentha which is pungent in taste with post ingestive effects. A number of health benefits have been attributed to green tea, including prevention or control of atherosclerosis, hypertension, CHD, DM and Obesity.
Aim: The aim of this study is to evaluate the preparation and free radical scavenging activity of mint and green tea formulation.
Materials and Methods: To 100ml of distilled water, 1g of green tea leaves and 1g powdered mint is added. This Mixture was heated for about 15-20 minutes and then filtered using filter paper. The mixture was again heated and concentrated from 70ml to 20ml. And then free radical scavenging activity was done and % of inhibition value was calculated.
Results: This shows that 50µl concentration of DPPH activity shows 86% of inhibition. Higher concentration of DPPH activity shows higher percentage of inhibition.
Conclusion: From the study, it has been concluded that high concentration(in µl) exhibits a higher

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percentage of inhibition. The highest percentage of inhibition of antioxidant property in mint and green tea formulation is about 86%. It shows that green tea and mint formulation shows better antioxidant activity.

Keywords: Mint; green tea; antioxidant activity; DPPH activity.

1. INTRODUCTION

Nanotechnology can be defined as the manipulation of matter through some physical or chemical processes which is used to create materials with specific properties which can be used in various applications. Green synthesis can provide some advancement over chemical and physical methods as it is cost effective, environment friendly, easily scaled up for large scale synthesis and in this method there is no need to use high pressure, energy, temperature and toxic chemicals. Green synthesis can help in better manipulation, control over crystal growth and their stabilization [1]. Green synthesis of nanoparticles using mint leaves is easily available and its extract has a good potential to reduce ions and it provides good antioxidant activity [2]. Green tea nutraceuticals are receiving increased attention worldwide due to their antioxidant or free radical scavenging activity and disease preventing properties. They have the ability to guard against the deleterious effects which are induced by various compounds by modulating the oxidative stress and their anti-inflammatory properties [3]. Natural antioxidants are mostly known to exhibit a wide range of biological effects, including antiviral, antibacterial, anti-inflammatory, antithrombotic, anti-allergic and vasodilatory activities. Antioxidant releasing compounds of the plant origin are vital substances which have the ability to protect the body from coronary diseases and from damage caused by free radical induced oxidative stress [4].

A number of different health benefits have been attributed to green tea which also includes the prevention and/or control of atherosclerosis, hypertension, coronary heart disease, diabetes, metabolic syndrome, obesity and cancer as well as it also exhibits various properties like antibacterial, antiviral and antifungal activities [5]. Mint extract usually has better phenolic and flavonoid contents. It exhibits an excellent antioxidant activity, as measured by β-carotene bleaching and DPPH assays. It also showed a high superoxide- and hydroxyl-scavenging activity but it has only low iron-chelating ability [6]. The importance of the antioxidant compounds of the plant materials in the maintenance of health and protection from coronary heart disease and cancer has high research interest among the scientists, food manufacturers, and consumers. Potential sources of antioxidant compounds have been seen in several types of plant materials such as vegetables, fruits, leaves, oilseeds, cereal crops, barks and roots, spices and herbs, and crude plant drugs [7].

Previous study concludes it was found that drumstick, mint and carrot are potential sources of antioxidant components worldwide. They exhibit potent antioxidant activity in different lipid systems. The antioxidant activity of extracts varied with pH, heat treatment and storage [8]. The antioxidant activity of green tea prepared with RO was strong, though its catechin monomer concentrations were only mid-level. This suggested that the synergistic effect of catechins, caffeine, and other components might be more important than any single component in free radical scavenging [9]. Extracts of green tea may also contribute to a reduction in the risk of cardiovascular disease, cancer, as well as to the promotion of oral health, physiological functions such as anti-hypertensive effect, body weight control, antibacterial and antiviral activity, solar ultraviolet protection, bone mineral density increase, anti-fibrotic properties, and neuroprotective power [10]. Some studies indicated that green tea exhibits an antiproliferative activity on liver cells, hypolipidemic activity in hepatoma-treated rats, as a preventive agent against mammary cancer post-initiation [11,12,13,14]. It also acts as antitumorigenic agents and as immune modulators in immune dysfunction caused by transplanted tumors or by carcinogen treatment [15]. Some of the Mentha species is better known for its flavoring and medicinal properties and is used in food, cosmetics, and medicines. It is also known to be helpful in symptomatic relief from illnesses such as colds, cramps, indigestion, nausea, sore throat, toothache, or even cancer [16]. Previous study stated that both green and black tea leaves possess a marked anti-inflammatory effect against the denaturation of protein *in vitro*. Green tea is considered as a

type of cured tea that is non fermented and produced by drying and steaming the fresh leaves [17]. The curry and mint leaf extracts were prepared with various solvents or solvent mixtures of different polarities to optimise the best extractant that lead to maximum production of a natural antioxidant property [18]. The effect of selenium type composition of selenium-enriched green tea, illustrate the interaction of the components in selenium-enriched green tea and their synergistic effects on enhancing antioxidant activity compared with regular green tea [19]. Our team has extensive knowledge and research experience that has translate into high quality publications [20–30,22,31-39]. The aim of this study is to evaluate the preparation and free radical scavenging activity of mint and green tea formulations.

2. MATERIALS AND METHODS

2.1 Preparation of Herbal Formulation

To 100ml of distilled water, 1g of green tea leaves and 1g of powdered mint is added. This mixture was heated for about 15-20 minutes and then filtered using filter paper. The mixture was again heated and concentrated from 70ml to 20ml.

2.2 Free Radical Scavenging Activity (DPPH METHOD)

DPPH assay was used to test the antioxidant activity of green tea and mint herbal formulation. Diverse concentrations (2-10 µg/ml) of green tea and mint extract were mixed with 1 ml of 0.1mM DPPH in methanol and 450 µl of 50 mM Tris HCL buffer (pH 7.4) and incubated for 30 minutes. Later, the reduction in the quantity of DPPH free radicals was assessed dependent on the absorbance at 517nm. BHT was employed as control. The percentage of inhibition was determined from the following equation,

% inhibition = Absorbance of control - Absorbance of test sample/Absorbance of control

3. RESULTS AND DISCUSSION

Green synthesis of mint and green tea formulation:

Fig. 1. Showing the pictures of preparation of mint and green tea formulation

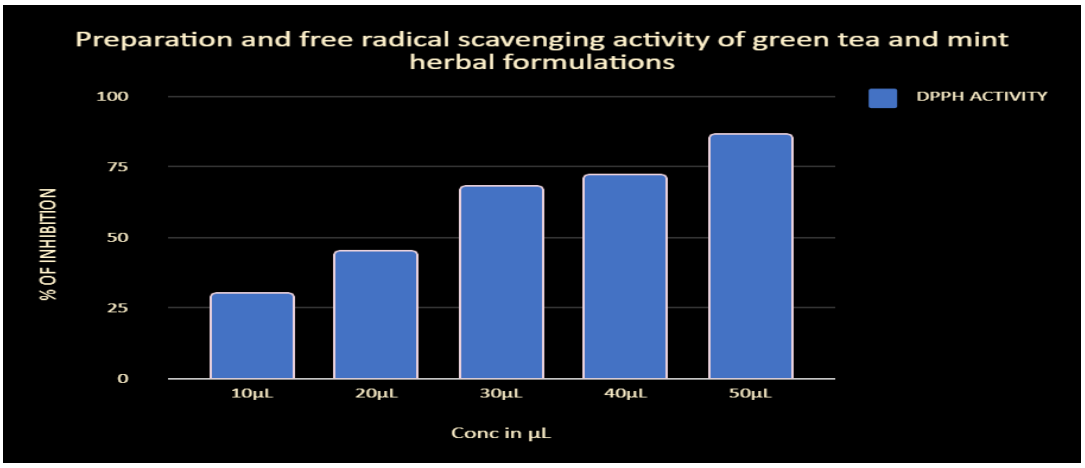

Fig. 2. Free radical scavenging activity of mint and green tea formulations

Fig. 2 shows the bar graph of free radical activity of mint and green tea formulation. The antioxidant activity was assessed in five different concentrations of reaction mixture from 10µL, 20 µL, 30 µL, 40 µL and 50 µL. Antioxidant activity of different percentages of inhibition of oxidation was noted such as 26% inhibition at 10µL, 49% inhibition at 20µL, 73% inhibition at 30µL, 74% inhibition at 40µL and 86% inhibition at 50µL which is standard.

Green tea plant extract may contain healthy bioactive compounds. It helps in reducing inflammation and helping to fight cancer due to natural antioxidants [40,41]. Moreover the plant formulations of green tea and mint exhibits the better antioxidant property [42,43], cytotoxic activity [44,45], antimicrobial activity [46,47] and anti inflammatory activity [48,49,36,50-63].

4. CONCLUSION

Antioxidant activity of different percentages of inhibition of oxidation was noted such as 26% inhibition at 10µL, 49% inhibition at 20µL, 73% inhibition at 30µL, 74% inhibition at 40µL and 86% inhibition at 50µL which is standard. From this, It is seen that the concentration is constantly increasing as % of inhibition is also increasing accordingly. It has been concluded that high concentration(in µl) exhibits a higher percentage of inhibition (86%). It shows that green tea and mint formulation shows better antioxidant activity.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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