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Original Article

EVALUATION OF *IN VITRO* ANTIOXIDANT POTENTIAL OF SPENT CHILLI AND SPENT CUMIN OBTAINED AFTER OLEORESIN EXTRACTION

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ABSTRACT

Objective: Chilli spent residue (CHSR) and Cumin spent residue (CSR) obtained after oleoresin extraction is known to be rich in polyphenols, however, the very limited commercial application is known except for its use as veterinary feeds. Considering that a huge residue is left over by oleoresin spice industry, application-oriented utilization of spent residue of chilli and cumin is warranted. In these lines, we in this study evaluate the antioxidant potential of Chilli spent residue (CHSR) and Cumin spent residue (CSR) obtained after oleoresin extraction by DPPH method.

Methods: *In vitro* radical scavenging activity of CHSR and CSR obtained after oleoresin extraction was evaluated by checking its role in scavenging DPPH.

Results: The spent chilli extract exhibited higher DPPH scavenging activity when compared to the spent cumin and the IC_{50} values of spent chilli; spent cumin and ascorbic acid were found to be 186.23±1.05 µg/ml, 284±1.03 µg/ml and 33.21±1.04, respectively. As CHSR and CSR obtained after oleoresin extraction is known to be rich in polyphenols, these might be responsible for potent and significant antioxidant activity observed.

Conclusion: This study shows that by-products obtained/generated in oleoresin industry can be utilized as value added product. Future work will be interesting to know the chemical composition and better understand the mechanism of action of the antioxidants present in the extract for development as a drug for therapeutic application.

Keywords: Antioxidant, Industry, Polyphenols, Oleoresin, Reactive oxygen species, Therapeutics.

INTRODUCTION

Reactive oxygen species (ROS) are highly reactive and toxic molecules that are generated in the cells under normal metabolic activities. ROS can cause oxidative damage to proteins, lipids, enzymes, and DNA molecules [1]. To counteract on excess ROS-induced cellular injury, living cells possess powerful scavenging mechanisms; however with ageing and under the influence of external stresses; these mechanisms become inefficient, thus leading to metabolic distress. Hence, free radicals are implicated in several metabolic diseases that include heart diseases, acquired immunodeficiency syndrome, diabetes mellitus, arthritis, cancer, ageing, liver disorder, etc., In this context, the antioxidant therapy has gained utmost importance in the treatment of these diseases. The World Health Organization estimates that 4 billion people (i.e. 80% of the World's population) use herbal medicines in some aspects of primary healthcare and there is a growing tendency to "Go Natural" [2]. All round the world, the medicinal properties of plants, herbs and or spices with nutraceutical aspects have been investigated and explored for their potent antioxidant activities to counteract the metabolic disorders [3-5]. Plants are considered with no side effects and with high economic viability for usage [3-5].

Spices are mainly used for their aroma and flavor they impart to food. Chilli (*Capsicum annum*) and cumin (*Cuminum cyminum*) are the commercially important major spice that is valued for both its color and pungency. The spent Chilli spent residue (CHSR) and Cumin spent residue (CSR) obtained after oleoresin extraction is known to be rich in polyphenols. However, the very limited commercial application is known except for its use as veterinary feeds. Considering the huge residue left over by spice oleoresin industry, application-oriented utilization of Chilli spent residue (CHSR) and Cumin spent residue (CSR) is warranted. Further, the development of spice processing industries has made it necessary to look into the beneficiation of the by-products generated during the processing of spices to add value to the produce. Despite several reports on medicinal properties of chilli and cumin including the antioxidant activity, the spent extracts antioxidant activities have not been studied till date. In these lines we evaluated the antioxidant potential of Chilli spent residue (CHSR) and Cumin spent residue (CSR) obtained after oleoresin extraction.

MATERIALS AND METHODS

Materials

Ascorbic acid, 2,2-diphenyl-1-picrylhydrazyl (DPPH) were procured from SRL Chemicals, India. All the other reagents and solvents were of analytical grade.

Extraction of antioxidants from spent chilli and spent cumin

To the spent chilli (50g) and spent cumin (50g) powder after oleoresin extraction, 300 ml of 80% methanol is added and soaked for 2 h following which decanted into a conical flask. Again about 300 ml of 80% methanol is added to the spice powder and soaked for 2 h and the process is continued for 4 to 6 times. The residue got after distillation is kept under vacuum to evaporate the solvent completely and dried completely. Then the weight of the antioxidant extracted from the spice powder is noted.

DPPH free radical scavenging activity [DPPH]

Quantitative measurement of radical scavenging properties spent chilli extract & spent cumin extract was carried out according to the method of Blois, [6]. Briefly, a 0.1 mM solution of 2, 2-diphenyl-1-picryl-hydrazyl (DPPH*) in methanol was prepared and 1 ml of this solution was added to 3 ml of the both spent chilli extract and spent cumin extract at different concentration (1-250 µg/ml). Ascorbic acid was used as a positive control. After incubation for 30 min in the dark, the discoloration was measured at 517 nm. Measurements were taken in triplicate. The capacity to scavenge the DPPH* radical was calculated and expressed as percent inhibition using the following equation:

I %= (Absorbance of control–Absorbance of test/Absorbance of control) x100

The IC_{50} values (concentration of sample required to scavenge 50% of free radicals) were calculated from the regression equation prepared from the different concentrations of both the extracts.

Statistical analysis

The experiments were carried out in triplicate and results are given as the mean±standard deviation. The data in all the experiments were analyzed (Microsoft Excel 2007) for statistical significance using Students *t*-test and differences were considered significant at $p<0.05$.

Table 1: IC_{50} Values of spent chilli and spent cumin extracts and standard ascorbic acid

Samples	IC_{50} Values (µg/ml)
	DPPH Assay
Spent chili extract	186.23±1.05
Spent Cumin extract	284.45±1.03
Ascorbic Acid	33.21±1.04

Each value is expressed as mean±SD.

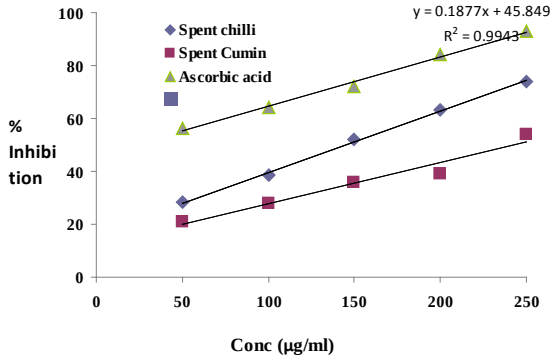

Fig. 1: Free radical scavenging activity of spent chilli and spent cumin. Ascorbic acid is included as positive control. Activity was measured by the scavenging of DPPH radicals and expressed as % Inhibition. Each value is expressed as the mean±standard deviation

RESULTS AND DISCUSSION

Spices are important constituents and considered to be the building blocks of flavor in food. Their primary functions are to provide aroma, texture and color to food. In addition, they also act as a preservative, and provide nutritional, and health benefits. There is a huge residue left over by spice oleoresin industry and application oriented utilization of chilli spent residue (CHSR) and cumin spent residue (CSR) is warranted as a beneficiation of the by-products generated to add value. When extracted, the yield of spent chilli extract and spent cumin extract obtained was 13.4 % & 12.7 % respectively. Further, the antioxidant potential of chilli spent residue (CHSR) and cumin spent residue (CSR) by DPPH method is evaluated. DPPH is a stable free radical, which has been widely accepted as a tool for estimating free radical-scavenging activities of antioxidants [8]. Further, the percentage inhibition of DPPH in the presence of spent chilli, spent cumin and standard ascorbic acid are as shown in fig. 1. The spent chilli extract exhibited an inhibition of 74%, whereas spent cumin extract showed 54% inhibition at the concentration of 250 µg/ml. Therefore, in the present study the spent chilli extract exhibited higher DPPH scavenging activity when compared to the spent cumin extract; however the standard ascorbic acid exhibited the highest antioxidant activity with 93% inhibition (fig. 1). The IC_{50} values of spent chilli, spent cumin and ascorbic acid were found to be 186.23±1.05 µg/ml, 284±1.03 µg/ml and 33.21±1.04, respectively (Table.3). The results indicate that among the two, spent chilli extract (186.23±1.05 µg/ml) processed potent DPPH scavenging activities. Chilli spent residue (CHSR) and Cumin spent residue (CSR) obtained after oleoresin extraction is known to be rich in polyphenols [9] and polyphenols are shown to exhibit potent antioxidant activities [10]. In general, the polyphenols present in chilli and cumin are known for their high antioxidant potential thus having potential various health benefits [9]. Our results substantiate and indicate that the spent chilli and spent cumin extracts after oleoresin treatment have a noticeable effect on scavenging free radicals, which can be related to its polyphenols content and thus can be exploited for its therapeutic application.

CONCLUSION

The findings of this study support the view that the extracts obtained after oleoresin treatment of chilli and cumin ie. Chilli spent residue (CHSR) and cumin spent residue (CSR) has considerable radical scavengers activities as estimated by DPPH method. As CHSR and CSR obtained after oleoresin extraction is known to be rich in polyphenols, these might be responsible for potent and significant antioxidant activity observed. This study shows that by-products obtained/generated in oleoresin industry can be utilized as value added product. Future work will be interesting to know the chemical composition and better understand the mechanism of action of the antioxidants present in the extract for development as drug for therapeutic application.

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ETHICAL ISSUES

There is none to be applied

CONFLICTS OF INTERESTS

Declared None

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