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Review Article

# To Study Antioxidant and Anticancer activity of aqueous extract of Onion peels, Potato peels, Garlic peels and Chilli pedicle

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## ABSTRACT

The present research work is based on the formulation of herbal granules by incorporating the aqueous extract of onion peels, garlic peels, potato peels, and chilli pedicles. The aqueous extract of the plant was extracted and then subjected to phytochemical tests, fluorescence tests, antioxidant activity, and anticancer activity. Then it was formulated into granules and evaluated for various parameters like angle of repose, bulk density, and tapped density. The preliminary chemical studies showed that the extract contains flavonoids, alkaloids, glycosides, carbohydrates, vitamins, and tannins. The formulated granules exhibited good flow properties, which showed good angle of repose, bulk density, and tapped density. The antioxidant and anticancer activity showed the herbal granules to be more potent. An herbal granule was prepared, as this particular formulation can be used for plant growth hormone.

The IC50 value of aqueous extract shows 166.486 µg/ml for antioxidant activity (shown in Table no 3.) and IC50 value of Standard Ascorbic acid shows 23.7148 µg/ml antioxidant activity. (Shown in Table no. 3). The LC50 value of aqueous extract shows 212.97 µg/ml for anticancer activity (shown in Table no.4) & The LC50 value of standard extract shows 0.00 µg/ml for anticancer activity. (Shown in Table no.4).

## INTRODUCTION

Onion *(Allium cepa)* is the most routinely used ingredient in Indian cooking and is also one of the commonly cultivated and consumed vegetables globally. [1] onion wastes remain underutilized even after being a rich source of bioactive compounds such as phenols, flavonoids and flavanols. [2]

The presence of all these bioactive compounds confers on onion peel its various therapeutic benefits in preventing cancer, obesity, diabetes, neurodegenerative disorders, cardiovascular disorders, microbial damage and erectile dysfunction. [3] Potato *(Solanum tuberosum L.)* is ranked among one of the chief crops producing worldwide. [4]

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Potato peel as a byproduct of food processing industry poses to be totally inexpensive, valuable and affordable starting material for the production of economically important substances, value addition, product extraction including dietary fiber, biopolymers, natural antioxidants, and natural food additives. [5]

Potato peel contains various polyphenols and phenolic acids which are responsible for its antioxidant activities. [6]

Garlic *(Allium sativum*) is a species of bulbous flowering plant in the genus *Allium* and has been known since the ancient times to have many benefits. [7]

Garlic peels also has high antimicrobial and antioxidant properties and its possibility of using it as a preservative in cooked beef was explored the phytochemical activities of garlic peel extract and its potential utilization as a natural food additive and functional ingredient in the future. [8]

*Capsaicin* are the group of compounds found in chillis and *capsicum* group of vegetables, and they are the one actually who are responsible for imparting typical the hot burning taste to chillis. [9]

*Capsaicin* has been reported to possess anticancer activities. It can bind to cancer cells and destroy them. [10]

Chillis have been found to contain a blend of different Vitamins and phytochemicals, i.e., carotenoids, Vitamin C, phenols, foliates, etc. [11]

## MATERIAL & METHODS:

### Extraction Procedure:

1. Initially, take enough amounts of dry onion, potato, garlic peels, and chilli pedicles that have been collected from household waste.
2. Then take a jar, add these peels and pedicles to it, and add sufficient water to it.
3. Then cover the jar with a lid and keep it in sunlight for 48–72 hours.
4. Then, after 48–72 hours, the mixture of peels and pedicles were filtered.
5. The aqueous extract was evaporated on the Soxhlet apparatus.
6. A semisolid mixture of extract was obtained.
7. Finally, it was kept for 24 hours to cool the extract. [12]

**Figure No.1 Extract**

### Phytochemical Tests:

❖ **Detection of Carbohydrates:**

1. **Molisch's test:** To 2-3 ml. extract, add few drops of alpha-naphthol solution in alcohol shake and add conc. H2SO4 from side of the test tube. Violate ring is formed at the junction of the two liquids.
2. **Fehling's test:** Mix 1 ml of each Fehling's A and Fehling's B solution, and bubble for 1 moment. Add equivalent volume of test extract solution. Warmth the test tube in bubbling water bath for 5-10 min. Initial a yellow, at end point black red ppt. is watched.

❖ **Detection of Proteins:**

1. **Biuret test:** To 3 ml. T.S. add 4% NaOH and few drops of 1% $CuSO_4$, solution Violet or pink color appears.
2. **Million's test:** Mix 3 ml. T.S. with 5 ml. Million's reagent. White ppt. Warm ppt brick red or the ppt dissolves giving red colored solution.

❖ **Detection of Glycosides:**

1. **Legal's test (Test for cardenolides'):** To aqueous or alcoholic extract, add 1 ml. pyridine and sodium nitroprusside. Pink to red color appears.

2. **Test for deoxy sugars (Keller-Killiani test):** To 2 ml. extract, add glacial acetic acid, one drop $FeCl_3$ and conc. $H_2SO_4$. Reddish brown color appears at junction of the two liquid layers and upper layer appears bluish green.

❖ **Detection of Flavonoid:**

1. **Lead acetate test:** Extract was treated with a couple of drops of lead acetate solution. Solution of yellow shading hasten showed the presence of flavonoids.
2. **Shinoda test**: To extract add 5ml. 95% ethanol, few drops of conc. HCI and 0.5 gm magnesium turnings. Pink color observed.

❖ **Detection of Alkaloids**

1. **Moyer's test**: 2-3 ml. filtrate with few drops Mayer's reagent gives ppt.
2. **Wagner's test**: 2-3 ml. filtrate with few drops Wagner's reagent gives reddish brown ppt.

❖ **Detection of Tannins & phenolic compounds:**

1. **Acetic acid solution**: red color solution.
2. **Dilute HNO3**: reddish to yellow color**.** [13]

**Fluorescence Test:**

Fluorescence analysis is effectively sensitive which can be used to characterize the crude drugs. The behavior of the drug powder with different reagents will be helpful in characterization of the crude drug. Fluorescent colour is specific for each compound. Plant material gives different coloration when treated with various chemicals. The crude drug when viewed under UV light showed different fluorescence at different wavelengths. This is due to the presence of different phytochemical constituents in the drug. After treating with different chemical reagents, the fluorescent behavior of the powdered leaf material was observed in day light and under UV light at 266 nm. [14]

**Antioxidant Activity:**

The free radical scavenging potential of Parkinsonia aculeata root extracts were tested by using the methanolic solution of DPPH. DPPH is a stable free radical. Antioxidants reduce DPPH to the 2. 2-diphenyl 1-picryl hydrazine which is measured at 517 nm. Ascorbic acid is used as standard antioxidant. According to the method of brand Williams et al. the assay is performed. The reaction mixture used to evaluate this activity contains 0.1 ml of aqueous solution of different extracts (containing 50, 100, 150, 200 and 400 ug/ml) and 3,9 ml methanolic solution of DPPH. For standard 0.1 ml of ascorbic acid was used instead of extract. And for blank preparation 0.1 ml of methanol was used. This mixture was incubated) £ 30 minute in dark at room temperature. Absorbance measured at 517 nm. The percentage DPPH radical scavenging activity of all extracts was measured and compared with the standard. [15]

**Anticancer Activity:**

To make a sample of the extract, dissolve 25mg of extract in 20ml of DMSO and dilute to 10ml with distilled water to obtain a 2500µg/ml stock solution. This stock solution was serially diluted with sea water to 200, 400, and 800 µg/ml. Then, in 4.5ml of sea water containing 10 nauplii, 0.5ml of plant extract solution was added to make a final volume 5ml. [16]

## RESULTS & DISCUSSION:

**Phytochemical Tests:**

Various qualitative phytochemical tests are performed to detect the presence of the optional metabolites.

**Table No:1 Result of the phytochemical test for an extract of peels and pedicles of onion, potato, garlic, and chilli.**

| Sr. No. | Chemical constituents | Chemical test | Extract |
|---|---|---|---|
| 1 | Carbohydrate | Molisch test | + |
| | | Fehling's test | + |
| 2 | Proteins | Biuret test | + |
| | | Millions test | + |
| 3 | Glycosides | Legals test | + |
| | | Test for deoxy sugar | + |
| 4 | Flavonoids | Shinoda test | + |
| | | Lead acetate test | + |
| 5 | Alkaloids | Mayers test | + |
| | | Wagner's test | + |
| 6 | Tannins & Phenolic compounds | Acetic acid solution | + |
| | | Dilute $HNO_3$ | + |

**Fluorescence Test:**

Fluorescence is an optical phenomenon where the absorption of photons at a certain wavelength typically results in the emission of photons at a longer wavelength. The loss in energy between the absorbed and emitted photons is the result of vibrational relaxation, and this difference is referred to as a Stokes shift.

**Table No.: 2 Fluorescence characteristics of extract of peels and pedicles of onion, potato, garlic, and chilli.**

| Sr. No. | Extracts | Particulars of the treatment | |
|---|---|---|---|
| | | Under ordinary light | Under UV light (366nm) |
| 1 | Powder as such | Brown | Brown |
| 2 | Powder + 1 N NaOH (aqueous) | Yellow | Brown |
| 3 | Powder + 1N NaOH (alcoholic) | Brown | Violet |
| 4 | Powder + 1N HCL | Yellow | Green |
| 5 | Powder+ $H_2SO_4$(1:1) | Dark Brown | Violet |
| 6 | Powder +$HNO_3$ | Yellow | Light Green |
| 7 | Powder + Ammonia | Yellow | Light Blue |
| 8 | Powder + Iodine | Dark Brown | Violet |
| 9 | Powder + 5%$Fecl_3$ | Dark Brown | Violet |
| 10 | Powder + Acetic acid | Brown | Violet |

**Antioxidant activity:**

The results of the antioxidant assay showed both the standard ascorbic acid as well as extracts show DPPH radical scavenging activity. Besides increasing the concentration of drug shows increased inhibition. Aqueous extract extracts tested, showed good dose dependent DPPH scavenging activity. The $IC_{50}$ value of aqueous extract shows 166.486 µg/ml and $IC_{50}$ value of Standard Ascorbic acid shows 23.7148 µg/ml.

**Table No: 3 Inhibition of Free Radical formation (DPPH) of extracts of peels and pedicles of onion, potato, garlic, and chilli and Standard Ascorbic acid.**

| Concentration µg/ml | Aqueous extract (% Inhibition) | Standard Ascorbic acid (% Inhibition) |
|---|---|---|
| 50 | 34.23% | 53.64% |
| 100 | 40.66% | 91.20% |
| 150 | 35.21% | 94.09% |
| 200 | 35.75% | 95.38% |
| 400 | 36.83% | 98.7 % |
| $IC_{50}$ in µg/ml | 166.486 µg/ml | 23.7148 µg/ml |

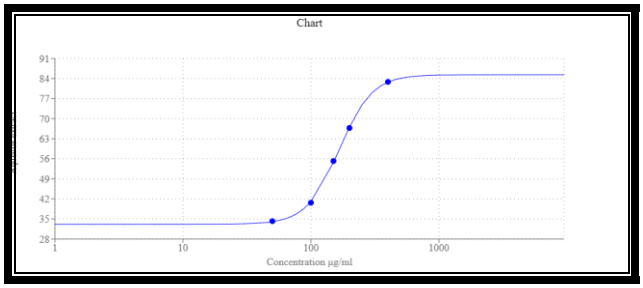


**Figure No: 2 Graphical presentations for $IC_{50}$ Value for Aqueous extract.**

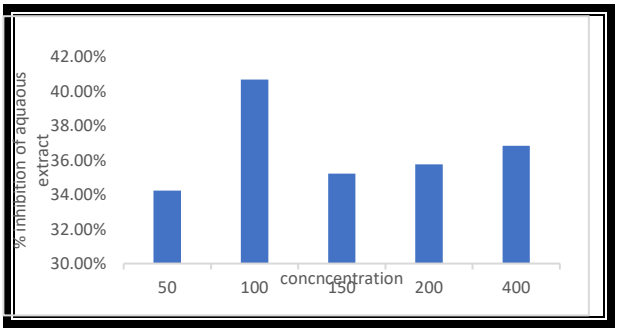


**Figure No: 3 $IC_{50}$ Value for Aqueous extract.**

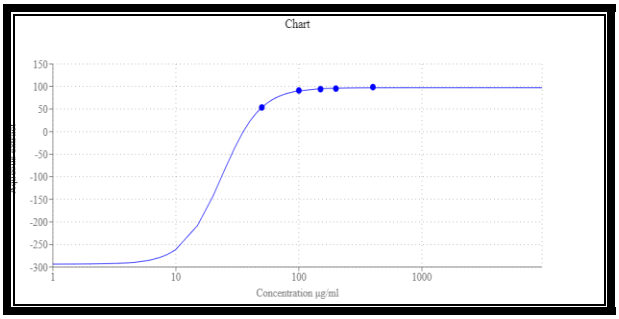


**Figure No: 4 Graphical presentations for $IC_{50}$ Value for Standard Ascorbic acid.**

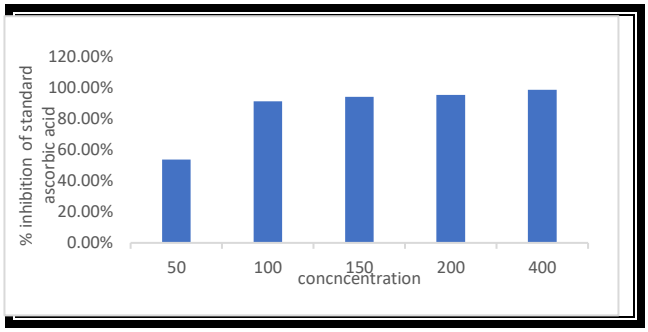


**Figure No: 5 $IC_{50}$ Value for Standard Ascorbic acid.**

**Anticancer activity:**

The lethality of a test sample in a simple zoological organism such as the shrimp (Artemia salina) has been utilized in the Brine Shrimp Cytotoxicity Test (BSCT).

The LC50 value of aqueous extract shows 212.97 µg/ml. (Shown in Table No:4)

**Table No: 4 $LC_{50}$ value of the extract of peels and pedicles of onion, potato, garlic, and chilli.**

| Extract | Concentration (µg/ml) | No. of nauplii dead out of 10. | | | Dead nauplii out of 30 | Live nauplii out of 30 | % mortality (mean +Sem) | $LC_{50}$ (µg/ml) |
|---|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | | | | |
| Aqueous Extract | 200 | 4 | 5 | 5 | 14 | 16 | 46.6666 | 212.97 (µg/ml) |
| | 400 | 6 | 7 | 6 | 19 | 11 | 63.3333 | |
| | 800 | 8 | 8 | 7 | 23 | 7 | 76.6666 | |
| Standard | 200 | 10 | 10 | 10 | 30 | 0 | 100 | 0.00 (µg/ml) |
| | 400 | 10 | 10 | 10 | 30 | 0 | 100 | |
| | 800 | 10 | 10 | 10 | 30 | 0 | 100 | |

**Table No: 5 Percentage Mortality of Anticancer activity**

| concn. | % Mortality |
|---|---|
| 200 | 46.6666 |
| 400 | 63.3333 |
| 800 | 76.6666 |

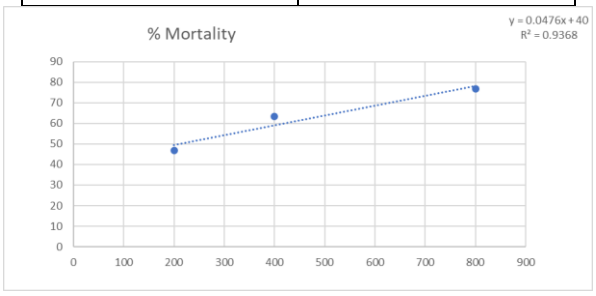


**Figure No: 6 Linearity graph for LC50 value calculation for the aqueous extract**

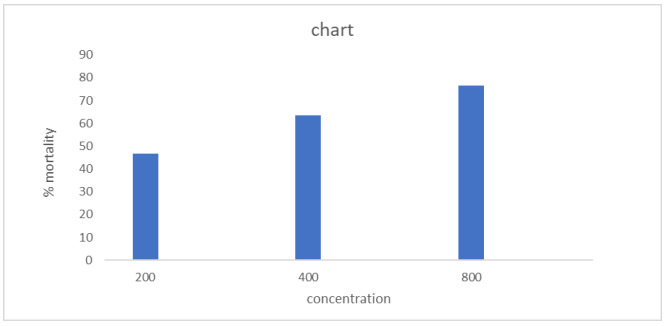


**Figure No: 7 LC50 value for the aqueous extract**

## CONCLUSION

The Onion peels, Garlic peels, Potato peels & Chilli pedicle extract were investigated to preliminary phytochemical screening which showed the presence of various Phyto-constituents such as alkaloids, flavonoids, glycosides, carbohydrates, proteins and tannins phenolic compounds. The presence of these bioactive compounds which are believed to be the reason for its potency. Fluorescence spectroscopy is a sensitive optical emission technique in which sample molecules are excited with a photon source. Those molecules that relax by radiant emission can be subsequently detected by measuring the intensity of that emission.

Aqueous extract screened showed synergistic to additive effects at varying concentrations. DPPH radical scavenging assay of the extract showed that, aqueous extracts scavenge DPPH free radical. The aqueous extract of Onion peels, Garlic peels, Potato peels & Chilli pedicle demonstrated cytotoxic action against brine shrimp and was thought to have active or powerful components. These plant species' ethnopharmacological properties are attributable to the various bioactive chemicals found in them.

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