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# Antioxidant evaluation of *Moringa oleifera* leaf extracts

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**Abstract**
*Moringa oleifera* is a promising plant having different therapeutic effects especially its leaf extracts having anticancer, antioxidant activities. In our study, we evaluate the antioxidant activity of *Moringa oleifera* leaf extracts.

**Keywords:** *Moringa oleifera*, antioxidant activities

## Introduction
The Moringa tree is an evergreen that grows new leaves year-round, with a projected production of six tons per hectare per year. The leaves are rich in polyphenols and poly flavonoids, which are antioxidants and potential anticancer compounds (Abdulrahman, K. A. et. al 2015) [2] many researchers start by exploring the antioxidant activity and anti-inflammatory activity of the leaf extracts as a preliminary screening for anticancer activity. One of the factors that cause cancer is oxidative stress which is an imbalance in the production of free radicals and oxidants and their elimination by antioxidants (Abdulaziz Rabiu Abdulkadir et. al 2015) [1]. Antioxidants can disrupt the formation of free radicals and reduce oxidative stress, which ultimately prevents cancer.

## Materials and Methods
The antioxidant activity of the leaf extracts was assessed by the following methods like DPPH radical scavenging assay and ABTS radical Cation Decolourization assay.

### Antioxidant Activity of *Moringa oleifera* Leaf Extracts
**The assessment of antioxidant activities of the *Moringa oleifera* leaf extracts were evaluated by the following assays**

### DPPH radical scavenging activity
The DPPH free radical scavenging activity for the *Moringa oleifera* leaf extracts was determined based on the method followed by (Mensor, et. al., 2001). Different concentrations of crude leaf extracts of *Moringa oleifera* was mixed with the 0.5ml of Methanolic DPPH. The mixture was incubated for 30 minutes at normal room temperature. Methanol alone served as a blank and Methanolic DPPH without the leaf extract served as a positive control for this assay. After incubation, the OD was measured at 518 nm using double beam spectrophotometer. The radical scavenging activity was calculated using the formula,

Scavenging activity (%)=$A_{518}$(Std)-$A_{518}$(blank)/$A_{518}$ (blank) × 100.

### ABTS Radical Cation Decolourization Assay
The ABTS assay for the *Moringa oleifera* leaf extracts was determined based on the procedure described by (Shirwaikar, *et al*., 2006). In this, the ABTS cationic radicals were produced when the ABTS solution was mixed with the ammonium persulphate. The solution was incubated in a dark place at room temperature for 12 – 16 hrs. 0.5 ml of the leaf extracts were added to the 0.3ml of the ABTS solution and it was made upto 1ml with the ethanol. The absorbance was measured at 745 nm. The % of inhibition of the leaf extracts were calculated using the above formula.

Inhibition (%) = Control – test / control ×100

## Results and discussion
The antioxidant property of *Moringa oleifera* leaf extract in different solvents was assessed by two different methods like ABTS and DPPH assays. The inhibitory concentration of the ABTS assay for the different solvents was found to be high in the Methanolic extract followed with the Ethanolic leaf extract whereas it was found to be low in the acetone extract (Figure. 1) and the inhibitory concentration of the DDPH assay was found to be higher in Methanolic extract followed with the ethanol and acetone extracts (Figure. 2).
The IC50 values in mg/ml for the ABTS and DPPH assays was found to be high in the Methanolic extract with the range of about 0.97 ± 0.01 and 1.74 ± 0.02 whereas very low in the Acetone extracts with the range of about 0.33 ± 0.02 and 0.85 ± 0.03 and it was found to be 0.54 ± 0.02 and 1.18 ± 0.03 in the Ethanolic leaf extract Comparative analysis antioxidant activity of different solvents of *Moringa oleifera* leaf was highly significant in all the solvents in the ABTS assay with the p-value of about <0.001 and q value of about 43.000, 64.000 and 21.000 mg/ml whereas significant in all the solvents in the DPPH assay with the p-value of about <0.001 and q value of about 35.818, 56.925 and 21.107 mg/ml

**Table 1:** Comparative statistical analysis of Antioxidant activity of *M. oleifera*extracts at $IC_{50}$ (mg/ml)

| Comparison | Difference | q | P value |
|---|---|---|---|
| ABTS | | | |
| Methanol vs Ethanol | *** | 43.000 | P<0.001 |
| Methanol vs Acetone | *** | 64.000 | P<0.001 |
| Ethanol vs Acetone | *** | 21.000 | P<0.001 |
| DPPH | | | |
| Methanol vs Ethanol | *** | 35.818 | P<0.001 |
| Methanol vs Acetone | *** | 56.925 | P<0.001 |
| Ethanol vs Acetone | *** | 21.107 | P<0.001 |

**Table 2:** Antioxidant activity of *M. oleifera* extracts at $IC_{50}$ (mg/ml)

| Solvents | ABTS | DPPH |
|---|---|---|
| Methanol | 0.97 ± 0.01 | 1.74 ± 0.02 |
| Ethanol | 0.54 ± 0.02 | 1.18 ± 0.03 |
| Acetone | 0.33 ± 0.02 | 0.85 ± 0.03 |

ABTS - 2, 2'-azinobis (3-thylbenzothiazoline-6-sulfonic acid); DPPH - 1, 1-diphenyl-2- picrylhydrazyl

## Conclusion

Though *Moringa oleifera* was established for its prospective medicinal values, more researches have to be carried out to study its antioxidant activities. Hence, the methanol, ethanol and acetone extracts of *Moringa oleifera* leaf was evaluated for its antioxidant activities.

Another report suggested that the antioxidant activity was found to be higher in the methanolic extract when compared with the other extract used in the previous study (Abdulaziz, *et al*., 2015). Many plant species possess antioxidant activity due to the presence of phenolic substances. In such way, the leaf sample of the *Moringa* possesses a high amount of antioxidant properties when compared with the other parts (Chumark, *et al*., 2008; Sreelatha and Padma, 2009). Ukachi, *et al*., 2015, reported that the methanolic leaf extract of *Moringa oleifera* possesses antioxidant activity when compared with the ethyl acetate extract. Hence, due to its high radical scavenging activity, it also possesses the property of arresting the cancer cell proleiferation and it can be used as a drug source for treating many diseases. The antioxidant assays such as ABTS and DPPH radical scavenging activity (Charoensin, 2014). The present study (Table.14) promotes that among the different solvents like methanol, ethanol and acetone the Methanolic leaf extract exhibits the high antioxidant activity with the $IC_{50}$ rages about 0.97 ± 0.01 and 1.74 ± 0.02 for the ABTS and DPPH assays)

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## Conflict of Interest

Authors shows no conflict of interest

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