

# COMPARATIVE STUDY OF ANTIOXIDANT POTENTIAL OF MORUS ALBA & GYMNEMA SYLVESTRE

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Doi: 10.47750/pnr.2022.13. S08.566

## Abstract

Antioxidants execute a protective role in health improvement and disease prevention. Recent studies have shown that many flavonoids and related polyphenols contribute significantly to the total antioxidant activity. *M. alba* is reported to have neuroprotective, skin tonic, antioxidant, anti-hyperglycemic, antibacterial, antihypertensive, and anti-hyperlipidemic. Other plant *Gymnema sylvestre* is used for treatment of urinary complaints, stomach problems, piles, habitual cough, breathing troubles, asthma, eye complaints, cardiopathy, constipation, jaundice, and bronchitis activities. This study deals with comparative study of anti-oxidant potential of both the plants. The results showed that the ethanolic extract of *Morus alba* & *Gymnema sylvestre* found to have the IC<sub>50</sub> value of 89.37 µg/ml and 65.47 µg/ml respectively by DPPH method. This suggests that *Gymnema sylvestre* can act as more potent anti-oxidant over *Morus alba*. These results are further confirmed by Nitric oxide method. The ethanolic extract of *Morus alba* & *Gymnema sylvestre* found to have the IC<sub>50</sub> value of 107.57 µg/ml & 89.52 µg/ml respectively. From results of both the methods it can be concluded that *Gymnema sylvestre* exhibits greater antioxidant capacity as compared to *Morus alba*.

**Keywords:** Antioxidants, *Morus alba*, *Gymnema sylvestre*, DPPH, Nitric oxide

## INTRODUCTION

Antioxidants are used to preserve and protect foods from rancidity, discoloration, or deterioration caused by autoxidation and are commonly used to improve the shelf life and stability of lipids and lipid-containing foods. Numerous epidemiological studies suggest that diets rich in phytochemicals and antioxidants execute a protective role in health improvement and disease prevention. They contain a variety of natural antioxidants and are considered to be more beneficial than antioxidant supplements. Recent studies have shown that many flavonoids and related polyphenols contribute significantly to the total antioxidant activity of many fruits and vegetables. Interest in natural antioxidants has led to the investigation of antioxidants in fruits, vegetables, herbs, spices and cereals (Bhatt *et al.*, 2013; Hamid *et al.*, 2010; Pietta *et al.*, 1998).

One such plant *Morus alba* Linn commonly known as white mulberry is cultivated throughout the world, wherever silkworms are raised. Because of its good therapeutic activity and low toxicity *M. alba* has been extensively used in conventional Chinese medicine. *M. alba* is reported to have neuroprotective, skin tonic, antioxidant, anti-hyperglycemic, antibacterial, antihypertensive, and anti-hyperlipidemic activities. The plant is a very good source of ascorbic acid, of which over 90% is present in a reduced form, and also contains carotene, vitamin b1, folic acid, folinic acid, isoquercetin, quercetin, tannins, flavonoids and saponin (Ercisli, and Orhan, 2007; Nomura *et al.*, 1980; Butt *et al.*, 2008).

Another medicinal plant *G. sylvestre* is one of the important medicinal plant used from neolithic times. The phytoconstituents responsible for sweet suppression activity includes triterpene saponins known as gymnemic acids, gymnemasaponins, and a polypeptide, gurmarsins. It is also used in the treatment of urinary complaints, stomach problems, piles, habitual cough, breathing troubles, asthma, eye complaints, cardiopathy, constipation, jaundice, and bronchitis. It's also used by trials to treat to neutralize the poison of snake bite (Manni and Sinsheimer, 1965; Srinivasan and Kumaravel, 2016). This study deals with evaluation of antioxidant activity of *Morus alba* & *Gymnema sylvestre*.

## MATERIALS AND METHODS

### Collection of plant materials

In order to acquire the most phytoconstituents, the leaves of *Morus alba* and *Gymnema sylvestre* were harvested from the Bhopal area in January 2019 while taking into account the seasonal conditions.

## ANTIOXIDANT ACTIVITY

### DPPH method

The total free radical scavenging capability of hydroalcoholic extracts from *Gymnemasylvestre* and *Morus alba* was calculated using the previously described methodology with a small modification. The DPPH solution (6 mg in 100 ml of methanol) was made and kept in a dark area. Different standard and test concentrations (10–100 g/ml) were prepared. In a separate test tube, 1.5 ml of DPPH and 1.5 ml of each standard and test were added. The solution's instantaneous absorbance at 517 nm was measured. As a control, 1.5 ml of methanol and 1.5 ml of DPPH were used at 517 nm (Molyneux,2004).

The percentage inhibition of free radical DPPH was calculated from the following equation: % inhibition = [(absorbance of control - absorbance of sample)/absorbance of control] × 100%.

### Nitric oxide method

The Griess reagent was measured after sodium nitroprusside was used to create nitric oxide. At physiological pH levels, sodium nitroprusside spontaneously generates nitric oxide in aqueous solution, where it interacts with oxygen to create nitric ions that may be measured using the Griess reagent. Nitric oxide production is reduced as a result of competition between nitric oxide scavengers and oxygen. Different extract concentrations were combined with sodium nitroprusside (10 mmol/L) in phosphate buffer saline (PBS), and the mixture was then incubated at 25°C for 150 minutes. The specimens were treated with Griess reagent (1% sulphanilamide, 2% H<sub>3</sub>PO<sub>4</sub>, and 0.1% naphthylethylenediamine dihydrochloride). The chromophore absorbance produced by the diazotization of sulphanilamide nitrite and subsequent coupling with naphthylethylenediamine was measured at 546 nm and referred to the absorption of ordinary ascorbic acid solutions treated in the same way with Griess reagent as a positive control. The following formula was used to assess the inhibition proportion:

$$\text{Radical scavenging activity (\%)} = (A_{\text{control}} - A_{\text{test}}) / A_{\text{control}} \times 100$$

Where A<sub>control</sub> is the absorption (without extract) of the control and where A<sub>test</sub> is the absorption in the presence of the extract / standard.

## RESULTS AND DISCUSSION

The ethanolic extract of *Morus alba* & *Gymnema sylvestre* found to have the IC<sub>50</sub> value of 89.37 µg/ml and 65.47 µg/ml respectively by DPPH method. This suggest that *Gymnema sylvestre* can act as more potent anti-oxidant over *Morus alba*. Theses results are further confirmed by Nitric oxide method. The ethanolic extract of *Morus alba* & *Gymnema sylvestre* found to have the IC<sub>50</sub> value of 107.57 µg/ml & 89.52 µg/ml respectively. From results of bot the methods it can be concluded that *Gymnema sylvestre* exhibits greater antioxidant capacity as compared to *Morus alba*.

### Results of antioxidant activity using DPPH model

**Table 1:** % Inhibition of ascorbic acid and extract of *Morus alba* using DPPH method

S. No.	Concentration (µg/ml)	% Inhibition	
		Ascorbic acid	Ethanolic extract
1	10	38.21	15.63
2	20	54.74	20.98
3	40	62.35	31.70
4	60	70.84	39.54
5	80	82.57	45.25
6	100	87.66	53.52
<b>IC 50</b>		<b>20.33</b>	<b>89.37</b>

**Table 2:** % Inhibition of ascorbic acid and extract of *Gymnema sylvestre* using DPPH method

S. No.	Concentration (µg/ml)	% Inhibition	
		Ascorbic acid	Ethanolic extract
1	10	38.21	21.54
2	20	54.74	34.67
3	40	62.35	45.84
4	60	70.84	50.36
5	80	82.57	54.95
6	100	87.66	60.41
<b>IC 50</b>		<b>20.33</b>	<b>65.47</b>

**Table 3:** % Inhibition of ascorbic acid and extract of *Morus alba* using NO method

S. No.	Concentration (µg/ml)	% Inhibition	
		Ascorbic acid	Ethanollic extract
1	20	43.63	8.57
2	40	67.24	16.98
3	60	77.42	22.41
4	80	80.56	36.85
5	100	84.57	47.94
<b>IC 50</b>		<b>16.55</b>	<b>107.57</b>

**Table 4:** % Inhibition of ascorbic acid and extract of *Gymnema sylvestre* using NO method

S. No.	Concentration (µg/ml)	% Inhibition	
		Ascorbic acid	Ethanollic extract
1	20	43.63	17.95
2	40	67.24	21.57
3	60	77.42	37.14
4	80	80.56	46.21
5	100	84.57	54.77
<b>IC 50</b>		<b>16.55</b>	<b>89.52</b>

## CONCLUSION

The findings of study revealed about antioxidant potential of ethanolic extract of both the plants. Although both the plant possess anti-oxidant activity the results from DPPH and NO assay revealed that *Gymnema sylvestre* antioxidant capacity is superior over *Morus alba*.

## REFERENCES

- Bhatt ID, Rawat S, Rawal RS. Antioxidants in medicinal plants. In *Biotechnology for medicinal plants 2013* (pp. 295-326). Springer, Berlin, Heidelberg.
- Hamid AA, Aiyelaagbe OO, Usman LA, Ameen OM, Lawal A. Antioxidants: Its medicinal and pharmacological applications. *African Journal of pure and applied chemistry*. 2010 Aug 31;4(8):142-51.
- Pietta P, Simonetti P, Mauri P. Antioxidant activity of selected medicinal plants. *Journal of Agricultural and Food Chemistry*. 1998 Nov 16;46(11):4487-90.
- Ercisli, S and Orhan E. Chemical composition of white (*Morus alba*) red (*Morus rubra*) and black (*Morus nigra*) mulberry fruits. *Food Chem*. 2007;103: 1380–1384.
- Nomura T, Fukai T and Kuwanon G. A new flavone derivative from the root barks of the cultivated mulberry tree (*Morus alba* L.). *Chem. Pharm. Bull*. 1980;28: 2548–2552.
- Butt MS, Nazir A, Sultan MT and Schroen K. *Morus alba* L. nature's functional tonic. *Trends Food Sci. Technol*. 2008; 19: 505–5
- Manni PE, Sinsheimer JE. Constituents from *Gymnema sylvestre* Leaves. *J Pharm Sci* 1965;54(10):1541-4.
- Srinivasan K, Kumaravel S. Unraveling the potential phytochemical compounds of *Gymnema Sylvestre* through Gc-MS study. *Int J Pharm Pharm Sci* 2016;8(1):450-3
- Molyneux P. The use of the stable free radical diphenylpicrylhydrazyl (DPPH) for estimating antioxidant activity. *Songklanakarinn J. sci. technol*. 2004 Dec;26(2):211-9.
- Abas F, Lajis NH, Israf DA, Khozirah S, Kalsom YU. Antioxidant and nitric oxide inhibition activities of selected Malay traditional vegetables. *Food Chemistry*. 2006 Apr 1;95(4):566-73.