Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(6): 2133-2135
Received: 11-09-2019
Accepted: 15-10-2019

R Kavitha
Ph.D., Department of Animal Nutrition, Madras Veterianry College, Vepery, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

C Valli
Department of Animal Nutrition, Madras Veterianry College, Vepery, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

R Karunakaran
Department of Animal Nutrition, Madras Veterianry College, Vepery, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

K Vijayarani
Department of Animal Nutrition, Madras Veterianry College, Vepery, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

R Amutha
Department of Animal Nutrition, Madras Veterianry College, Vepery, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Corresponding Author:
R Kavitha
Ph.D., Department of Animal Nutrition, Madras Veterianry College, Vepery, Chennai, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Assessment of antioxidant activity of some selected medicinal herbs available in Tamil Nadu

R Kavitha, C Valli, R Karunakaran, K Vijayarani and R Amutha

Abstract
Antioxidants are of natural or synthetic origin, used in the poultry feed to prevent deterioration during storage. Natural antioxidants are gaining popularity as a feed additive. To explore potential natural antioxidants, 16 herbs collected from all over Tamil Nadu were analyzed their Total Antioxidant Capacity (TAC). Significantly highest ($P< 0.05$) Total Antioxidant capacity was observed for *Syzygium aromaticum* (2910.38 ± 39.47) and significantly lowest ($P< 0.05$) TAC was observed for *Coriandrum sativum* (177.9 ± 36.52). *Emblica officinalis* (2649.00 ± 41.20) had the second significantly highest TAC. The third significantly highest TAC was present in *Curcurma Longa* (2228.89 ± 215.68). *Phyllanthus niruri* exhibited similar TAC as that of *Curcurma longa*. From the study it can be concluded that *Syzygium aromaticum*, *Emblica officinalis*, *Curcurma Longa* and *Phyllanthus niruri* are herbs that possess significantly highest TAC and are probable candidates to be explored as antioxidant feed additives for poultry.

Keywords: Herbs, total antioxidant capacity, natural antioxidants, poultry

Introduction
Antioxidants are an array of natural or synthetic substances that reduce damage caused by free radicals. The world- wide trend towards use of natural additives has created a growing interest in natural antioxidants found in plants. Herbs have been identified as sources of various phytochemicals, many of which possess powerful antioxidant activity (Dragland *et al.*, 2003) [4]. Herbs may contain α-tocopherol, ascorbate, carotenoids, zinc, flavonoids, polyphenols, and flavoproteins that act as antioxidants. Antioxidant factors found in herbs have demonstrated radical-scavenging capacities.

Antioxidants are regularly included as additive in poultry feed to protect the feed from deterioration during storage. Antioxidants are also added to poultry feed to improve the quality of poultry products. Currently the poultry industry uses large quantum of synthetic antioxidants. The scenario however, is rapidly changing; poultry industry is in search for suitable antioxidants derived from natural sources. It is in this context that the present study was carried out with the objective to evaluate the antioxidant property of some indigenous medicinal plants that are available in plenty in Tamil Nadu.

Materials and Methods
Sixteen herbs that are commonly available in Tamil Nadu were selected for the study. Different parts of the herbs have different active principles and the part that is traditionally used for medicinal purpose was selected for each particular herb. The herbs and their parts selected is listed in table 1. Six samples of each of the listed herbal part was collected from different districts across Tamil Nadu.

The collected samples were suitably cleaned from extraneous matter, shade dried for 72 hours and ground to pass through 1 mm sieve using a Willey mill. The ground samples were stored in air tight containers for further analysis.

The total antioxidant capacities of the samples were assessed using UV spectrophotometer (JASCO V 730), by the Phosphomolybdenum method according to the procedure described by Prieto *et al.* (1999) [6]. This method evaluates the Total antioxidant capacity (TAC) which is expressed as ascorbic acid equivalent. In this procedure the ascorbic acid has been used as a reference standard with which the potential antioxidants are compared (Abubakar *et al.*, 2013) [1]. To determine the Total antioxidant capacity (TAC) of the herbal samples, 0.05 g ground herbal powder was transferred to an Eppendorf tube to which was added one ml methanol. The contents were vortexed, to homogenize the mixture and left overnight (12-16 h) at 4 ^{O}C. After which, the contents were centrifuged for 10 min at 4 ^{O}C, the supernatant was then transferred to a cooled Eppendorf tube. From which 40 µl was taken and 4 ml of reagent solution (equal

amount of 0.6 M sulfuric acid + 28 mM sodium phosphate + 4 mM Ammonium molybdate) was added and again vortexed. The tubes were then incubated at 95 ^{O}C for 90 minutes and cooled to room temperature. The absorbance of the solution was measured at 695 nm against a blank sample. The absorbance value was fitted in a standard curve to arrive Total antioxidant capacity expressed as µmol ascorbic acid/g fresh weight. Statistical analysis of the data was carried out using IBM SPSS statistics software version 20.

Table 1: Part of herb used

S. No	Botanical name of the herb	Common name of the herb	Plant part used
1	*Emblica officinalis*	(Amla)	Fruit
2	*Piper nigrum*	(Black pepper)	Flower bud
3	*Cinnamomum verum*	(Cinnamon)	Bark
4	*Syzygium aromaticum*	(Clove)	Flower bud
5	*Coriandrum sativum*	(Coriander)	Seed
6	*Murraya koenigii*	(Curry)	Leaf
7	*Zingiber officinale*	(Dry ginger)	Rhizome
8	*Trigonella foenum*	(Fenugreek)	Seed
9	*Allium sativum*	(Garlic)	Bulb
10	*Phyllanthus niruri*	(Keelanelli)	Full plant with root
11	*Mentha* spicata	(Mentha)	Leaf
12	*Moringa oleifera*	(Moringa)	Leaf
13	*Azadirachta indica*	(Neem)	leaf
14	*Andro graphispaniculata*	(Nilavembu)	Leaf with stem
15	*Ocimum sanctum*	(Tulsi)	Leaf
16	*Curcuma longa*	(Turmeric)	Rhizome

Results and Discussion

In the present study Total Antioxidant Capacity (TAC) assay was carried out to determine the antioxidant content of the herbal samples. The Total Antioxidant capacity (micro gram ascorbic acid equivalent /g of herbal powder) of the herbs analyzed is presented in Table-2.

Table 2: Total Antioxidant capacity (micro gram ascorbic acid equivalent /g of herbal powder) of different herbs available in Tamil Nadu (Mean* ± SE)

S. No	Botanical name of the herb	Common name of the herb	Plant part analysed	Total Antioxidant capacity (micro gram ascorbic acid equivalent /g of herbal powder)
1	*Emblica officinalis*	(Amla)	Fruit	2649.00 ^{j} ± 41.20
2	*Piper nigrum*	(Black pepper)	Flower bud	1080.00 ^{efg} ± 45.25
3	*Cinnamomum verum*	(Cinnamon)	Bark	1328.00 ^{gh} ± 44.59
4	*Syzygium aromaticum*	(Clove)	Flower bud	2910.38 ^{k} ± 39.47
5	*Coriandrum sativum*	(Coriander)	Seed	177.95 ^{a} ± 36.52
6	*Murraya koenigii*	(Curry)	Leaf	1059.00 ^{ef} ± 62.81
7	*Zingiber officinale*	(Dry ginger)	Rhizome	757.00 ^{de} ±103.25
8	*Trigonella foenum*	(Fenugreek)	Seed	404.00 ^{ab} ± 22.53
9	*Allium sativum*	(Garlic)	Bulb	679.88 ^{cd} ± 29.19
10	*Phyllanthus niruri*	(Keelanelli)	Full plant with root	2080.00 ^{i} ± 44.35
11	*Mentha* spicata	(Mentha)	Leaf	1164.38 ^{fg} ± 101.43
12	*Moringa oleifera*	(Moringa)	Leaf	537.37 ^{bc} ± 5.41
13	*Azadirachta indica*	(Neem)	leaf	870.00 ^{de} ± 119.01
14	*Andro graphispaniculata*	(Nilavembu)	Leaf with stem	412.00 ^{ab} ± 19.27
15	*Ocimum sanctum*	(Tulsi)	Leaf	1502.59 ^{h} ± 145.14
16	*Curcuma longa*	(Turmeric)	Rhizome	2228.89 ^{i} ± 215.68

*Mean of six samples

Means bearing different superscript within column differ significantly ($P< 0.05$)

The results indicate that each herbal powder has its own unique antioxidant level. All the herbal powders analysed were found to have Total antioxidant capacity of more than 100 micro gram ascorbic acid equivalent /g of herbal powder. Significantly highest ($P< 0.05$) Total Antioxidant capacity was observed for *Syzygium aromaticum* (Clove buds). Shan *et al*. (2005) [8], also had reported that Clove buds was the spice presenting higher antioxidant activity, and it was highlighted that clove had a huge potential as radical scavenger. Chatterjee *et al.*, (2013) [3] had also reported that extracts from clove buds could also be used as food antioxidants.

Emblica officinalis had the second significantly highest Total antioxidant capacity. The third significantly highest Total antioxidant capacity was present in *Curcurma Longa.* Turmeric varieties were reported as promising sources of natural antioxidants, as indicated by their high contents of polyphenols, flavonoids, tannins, and ascorbic acid and by their considerable DPPH free radical-scavenging activities and FRAP values (Tanvir *et al.*, 2017) [10]. Suresh *et al* (2006) [9] also had reported that the *Emblica officinalis* free (EOFP) and bound phenolics (EOBP) showed between four to 10 fold higher levels of antioxidant activity as evaluated by both free radical scavenging and reducing power assays compared to that of Curcuma longa free (CLFP) and bound phenolics (CLBP). Higher level of antioxidant activity in *Emblica officinalis* has been attributed to the phenolic content in them. The free and bound phenolics of *Emblica officinalis* showed high content of phenolic compounds (126 and 3.0 mg/g)

compared to that of *Curcuma longa* (29.7 and 1.6 mg/g). Gallic acid and tannic acid were identified as the major antioxidant components in phenolic fractions of *Emblica officinalis*.

Phyllanthus niruri exhibited similar Total Antioxidant capacity as that of *Curcurma longa*. *Phyllanthus niruri* extract was reported (Rusmana *et al.*, 2017) [7] to contain saponin, phenol, flavonoid and tannin, and it showed high FRAP activity which was 373.95 µM Fe(II)/µg extract.

Piper nigrum, Cinnamomum verum and Mentha spicata had the fourth significantly highest Total Antioxidant capacity. The Total Antioxidant capacity of other herbal powders analysed were below 1000 micro gram ascorbic acid equivalent /gram powder. Significantly lowest ($P < 0.05$) level of Total Antioxidant capacity was observed for *Coriandrum sativum* (Coriander seeds).

Conclusion

From the study it can be concluded that *Syzygium aromaticum*, *Emblica officinalis*, *Curcurma Longa* and *Phyllanthus niruri* are herbs that possess significantly highest Total Antioxidant capacity and are probable candidates to be explored as antioxidant feed additives for poultry.

References

1. Abubakar BA, Mohammed IA, Musk AM, Aisha Musa Free radical scavenging and total antioxidant capacity of root extracts of *Anchomanes difformis* Engl. (Araceae). *Acta poloniae pharmaceutica* 2013; 70(1):115-21
2. Aderogba MA, Okoh EK, Idowu TO, J Biol. Sci. 5.239 Abubakar B. Aliyu, Mohammed A. Ibrahim, Aliyu M. Musa, Aisha O, Musa, Joyce J. Kiplimo and Adebayo O.Oyewale. Free radical scavenging and Total antioxidant capacity of root extracts of *Anchomanes difformis* Engl (Araceae) Acta Poloniae Pharmaceutica-Drug Research. 2005; 70(1):115-121.2013.
3. Chatterjee D, Bhattacharjee P. Supercritical Carbon Dioxide Extraction of Eugenol from Clove Buds. Food and Bioprocess Technology, 2013, 6(10).
4. Dragland S, Senoo H, Wake K, Holte K, Blomhoff R. Several culinary and medicinal herbs are important sources of dietary antioxidants. Journal of Nutrition. 2003; 133:1286-90.
5. Gurusiddaiah, Suresh, Nayaka, Mysore, Dharmesh, Shylaja *et al*. Free and bound phenolic antioxidants in Amla (*Emblica officinalis*) and turmeric (*Curcuma longa*). Journal of Food Composition and Analysis. 2006; 19:446-452. 10.1016/j.jfca.2005.12.015.
6. Prieto P, Pineda M, Aguilar M. Spectrophotometric quantitation of Antioxiant capacity through the formation of a Phosphomolybdenum complex: Specific application to the determination of vitamin E. Anal Biochem 1999; 269(2):337-41
7. Rusmana D, Wahyudianingsih R, Elisabeth M, Balqis B, Maesaroh M, Widowati W. Antioxidant activity of *Phyllanthus niruri* extract, rutin and quercetin. Ind. Biomed. J. 2017; 9:84-90.
8. Shan B, Cai YZ, Sun M, Corke H. Antioxidant capacity of 26 spice extracts and characterization of their phenolic constituents. Journal Agric Food Chem. 2005; 53(20):7749-59
9. Suresh Kumar G, Nayaka Harish, Dharmesh SM. Free and bound phenolic antioxidants in amla (*Emblica officinalis*) and turmeric (*Curcuma longa*). J Food Comp Anal. 2006; 19:446-452
10. Tanvir EM, Md. Sakib Hossen, Md. Fuad Hossain, Rizwana Afroz *et al*. Antioxidant Properties of Popular Turmeric (*Curcuma longa*) Varieties from Bangladesh. Journal of Food Quality. 2017, Article ID 8471785, 8 pages. https://doi.org/10.1155/2017/8471785