NIGERIAN SOCIETY FOR ANIMAL PRODUCTION

NSAP

Proceedings of

49th

ANNUAL CONFERENCE

24th – 27th March, 2024

Theme

Improving Animal Agriculture for Sustainable Economic Development in Nigeria

Held at:

University of Ibadan, Ibadan, Nigeria

Edited by

O. A. Abu, O. J. Babayemi, M. K. Adewumi

NIGERIAN SOCIETY FOR ANIMAL PRODUCTION

Proceedings of

49th

Annual

Conference

24th – 27th March, 2024

THEME:

IMPROVING ANIMAL AGRICULTURE FOR SUSTAINABLE ECONOMIC DEVELOPMENT IN NIGERIA

Held at

University of Ibadan, Nigeria

Edited by

Professor O. A. Abu, Professor O. J. Babayemi, Professor M. K. Adewumi

ISSN: 1596-5570

EVALUATION OF TURMERIC (*CURCUMA LONGA*) AS A POTENT NATURAL ANTIOXIDANT FOR POULTRY

Awobona, E.O., Akande, K.E. and Ijaiya, A.T.
Department of Animal Production, School of Agriculture and Agricultural Technology,
Federal University of Technology, Minna, Niger State, Nigeria.
Corresponding Author's Email: awobonaemmanuel2@gmail.com

ABSTRACT
Turmeric (Curcuma longa) has attracted attention due to its potent antioxidant activities standing out among other spices. Turmeric powder is bright yellow and aromatic derived from the rhizome of the plant. It is widely used due to their positive effects on the growth and health of poultry, probably as a result of their immune-stimulatory properties. In this study the DPPH (2, 2-diphenyl-1-picrylhydrazyl) assay was used to determine the antioxidant activity of turmeric using ascorbic acid as a standard antioxidant and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) as a free radical. It was observed from the results obtained that the DPPH free radical scavenging ability of turmeric was in the range of 27.23% to 60.23%. The antioxidant activity of ascorbic acid (the standard antioxidant) used in the experiment was 98.65%. It was revealed from the results that the inhibition activity of turmeric against the free radical increased with an increase in the level of the concentration of its extract from 0.2mg/ml to 1.0mg/ml. The implication of this showed that the effect of turmeric extract was dose-dependent. The values obtained for IC50 for the turmeric and vitamin C (ascorbic acid) were 0.717 and 0.320 respectively. Turmeric has the potential to serve as a natural substitute for synthetic antioxidant additives in poultry production.
Keywords: ***Curcuma longa*; natural antioxidant; dose dependent; free radical; poultry**

INTRODUCTION

Turmeric (*Curcuma longa*) is a vibrant yellow spice that is used for seasoning and flavouring in food preparation and it has long been recognized for its medicinal properties. Herbs and spices may become alternatives to antibiotics in playing a crucial role in promoting growth and animal well-being (Vijayasteltar *et al.,* 2016; Al-Shammari *et al*., 2017).

Turmeric is sometimes called turmeric root and yellow root. The prominent yellow colour of turmeric is due to the existence of curcumin, which consists of three main curcuminoid complexes: curcumin I, curcumin II, and curcumin III (Phan *et al*., 2001). The dehydrated root portion of turmeric contains about 8 % curcumin (Ruby *et al*., 1995). Curcumin possesses beneficial antioxidant properties.

There is a rising need for the replacement of synthetic antioxidants with natural sources that are easily available and safe. Therefore, the present research work was carried out to evaluate the antioxidant potential of turmeric powder and the possibility of its inclusion level as an aqueous extract administered via drinking water.

MATERIALS AND METHODS

Source of experimental test material

Turmeric (*Curcuma longa*) was purchased from Kure ultra-modern market Minna, Niger state. The tumeric was thoroughly washed with clean water, sliced into pieces and sun-dried for four days. After drying it was ground using an electric blender.

Preparation of the sample extract

The extract preparation of the turmeric powder was carried out by weighing one gramme (1g) of the grounded sample into a conical flask. Afterwards, 100ml of ethanol was measured and then added to the weighed sample in the flask. Extraction was performed for 40 minutes with the use of a digital 4-hole water bath (Model: E-Track England) at 70 degrees. The resultant extract was allowed to cool at room temperature and then filtered using a Whatman filter paper (No. 1).

DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay

In this experiment, the free radical used to evaluate the antioxidant activity of clove bud was 2, 2-diphenyl-1-picrylhydrazyl (DPPH), in line with the procedure as outlined by Mukherjee *et al*. (2011) with slight changes. The concentration of 100 μM of DPPH was dissolved in methanol to a final

concentration of 0.03mM. Serial dilutions were made to determine the IC50. In the 96-well microplate, the total volume was 100 μl which consisted of 90 μl of DPPH solution and 10 μl of the test solution. The contents were mixed and incubated for 30 minutes at 37°C. An ultraviolet spectrophotometer was used to determine the absorbance at 517 nm. Ascorbic acid was used as the standard antioxidant. All readings were taken in triplicate and the mean values were then recorded. A decrease in absorbance indicated increased radical scavenging activity which was determined by the following formula:

$$\% \text{ Inhibition} = \frac{Ac - At}{Ac} \times 100$$

Where Ac = absorbance of the control
At= absorbance of the test sample (turmeric powder)

RESULTS AND discussion

Antioxidant activity of turmeric

The DPPH free radical quenching ability of turmeric is depicted in Figure 1. The values obtained for IC50 for the turmeric and vitamin C (ascorbic acid) were 0.717 and 0.320 respectively. It was observed from the results obtained that the DPPH free radical scavenging ability of turmeric was in the range of 27.23% to 60.23% (Figure 1). Notably, at 1.0mg/ml concentration of turmeric extract its free radical scavenging activity was 60.23% as against 98.65% for ascorbic acid at the same concentration. It was revealed from the results that the inhibition activity of turmeric against the free radical increased with an increase in the level of the concentration of its extract from 0.2mg/ml to 1.0mg/ml. In regards to this observation in this present study. The implication of this showed that the effect of turmeric extract was dose-dependent. Kim *et al*. (2019) reported an antioxidant activity of 51.41% for turmeric leaf extract, this value is lower than the value of 60.23% for turmeric rhizome powder used in this study.

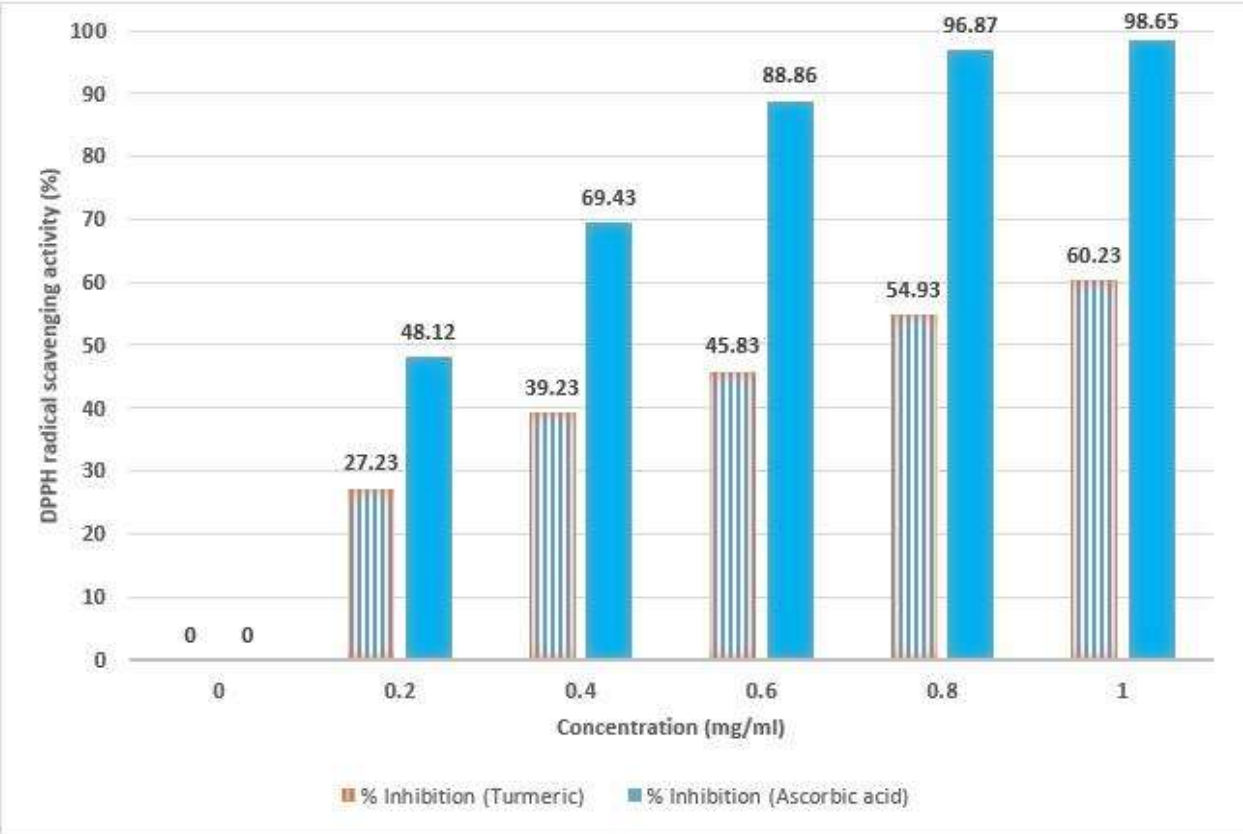

Figure 1: Antioxidant activity of turmeric

CONCLUSION

In this study, it was noted that increasing the concentration of turmeric extract resulted in a dose-dependent increase in DPPH radical scavenging activity. This study showed that turmeric has promising potential as a natural antioxidant for combating oxidative stress in poultry.

REFERENCES

Al-Shammari, K. I. A., Batkowska, J., & Gryzińska, M. M. (2017). Effect of various concentrations of an anise seed powder (Pimpinella anisum L.) supplement on selected haematological and biochemical parameters of broiler chickens. Brazilian Journal of Poultry Science, 19, 41-46. doi:10.1590/1516-635X19170003

Kim, S., Ko, S. C., Kim, Y. S., Ha, S. K., Park, H. Y., Park, Y., & Lee, S. H. (2019). Determination of Curcuma longa L. (Turmeric) leaf extraction conditions using response surface methodology to optimize extraction yield and antioxidant content. Journal of Food Quality, 2019, 1-8.

Mukherjee, S., Pawar, N., Kulkarni, O., Nagarkar, B., Thopte, S., Bhujbal, A., &Pawar, P. (2011). Evaluation of free-radical quenching properties of standard Ayurvedic formulation VayasthapanaRasayana. BMC Complementary and Alternative Medicine, 11, 38.https://bmccomplementmedtherapies.biomedcentral.com/articles/10.1186/1472-6882-11-38

Phan, T. T., See, P., Lee, S. T., & Chan, S. Y. (2001). Protective effects of curcumin against oxidative damage on skin cells in vitro: its implication for wound healing. Journal of Trauma and Acute Care Surgery, 51(5), 927-931.

Rahul, R., Arrivukkarasan, S., & Anhuradha, S. (2022). In Vitro Antioxidant and Free Radical Scavenging Activity of Curcuma longa, Acorus calamus and Camellia sinensis. Food and Nutrition Sciences, 13(8), 750-760

Ruby, A. J., Kuttan, G., Babu, K. D., Rajasekharan, K. N., & Kuttan, R. (1995). Anti-tumour and antioxidant activity of natural curcuminoids. Cancer Letters, 94(1), 79-83.

Vijayasteltar, L., Nair, G. G., Maliakel, B., Kuttan, R., & Krishnakumar, I. M. (2016). Safety assessment of a standardized polyphenolic extract of clove buds: subchronic toxicity and mutagenicity studies. Toxicology Reports, 3, 439-449.