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Turmeric (*Haldi*) - A strapping strategy for enhancing the immune system to reduce the effect of SARS-CoV-2

Jyoti Prakash Sahoo[1], Upasana Mohapatra[2], Ambika Prasad Mishra[3] and Kailash Chandra Samal[1]

[1]Department of Agricultural Biotechnology, OUAT, Bhubaneswar -751003; [2]Department of Plant Biotechnology, UAS, GKVK. Bengaluru – 560065; [3]Department of Soil Science and Agricultural Chemistry, OUAT, Bhubaneswar -751003

ABSTRACT
From the evolution of the human race, turmeric has been used in conventional medicinal drug development. For turmeric, India is in lead for producing, marketing and exporting. Curcumin, the primary curcumoid principle in turmeric, influences multiple signaling pathways and has been scientifically observed to have its anti-inflammatory, anti-oxidant, antimicrobial, hypoglycemic, wound healing, chemo-preventive, chemo-sensitizing and radio-sensitizing properties. To enhance the bioavailability of curcumin, important technologies like adjuvant, nano-particles, liposomes and phospholipid complexes are evaluated under the recent protocol of drug development. In India as well as worldwide it has been widely used as a common household treatment for cough, sore throat and respiratory ailments and might be an effective immunity booster against SARS-CoV-2 therapy during the ongoing pandemic situation.
Key Words: Turmeric, Curcumin, SARS-CoV-2, Immunity.

Turmeric (*Curcuma longa*) belongs to the family Zingiberaceae. It is a herbaceous perennial plant and it has great economic, medicinal and cultural importance. Curcumin is the active constituent of turmeric. Other curcuminoids observed in turmeric include desmethoxycurcumin and bis-dimethoxy curcumin. In addition to its use as a spice, turmeric has been used in India for medicinal purposes for centuries. More recently, it has been found that curcumin has anti-inflammatory and anticancer activities that have renewed scientific interest in its capability to prevent and treat the disease. Turmeric is a mild fragrant stimulant used in the manufacture of curry powders. The oleoresin component of turmeric is used for oil-containing products. It is also used for colouring compounds of various food items viz. cheese, salad, yoghurts, cakes, biscuits, popcorn, cereals, sauces, etc.

Raw turmeric juice is used to deal with hyperacidity and indigestion. The juice of uncooked turmeric also acts as a blood purifier. Curcumin, an active constituent of turmeric, has anti-oxidant and is generally used in alternative medicine. As per traditional belief, turmeric is predominantly applied in cuts, burns and wounds with antiseptic properties that promote healing. Curcumin also has an anti-inflammatory effect by reducing histamine levels. So, turmeric could be a powerful immunity booster, if taken in prescribed amount for the remedial measure of SARS-CoV-2.

Curcumin

The active ingredients (Figure 1) of turmeric are the flavonoid curcumin (diferuloylmethane), DMC (demethoxycurcumin), BDMC (dis \\\demethoxycurcumin) and diverse volatile oils, including tumerone, atlantone, and zingiberone. Curcumin has been shown to possess quite a lot of pharmacological activities, including antioxidant, anti-inflammatory and mostly it is useful against cancers chemo-preventive, and neuroprotective activities (Mehlaet al., 2010). The structures (Figure 1) of the curcumin and curcuminoids were determined in 1910 to be diferuloyl methanes (Aggarwal, 2007). Curcumin, or curcumin 1, has a molecular formula of C21H20O6. The price of the turmeric products is based totally on their curcuminoid content (B Mythri, *et al*, 2012). Turmeric has been used as a wonder ingredient for ages in India. Turmeric has been used as a wonder ingredient for ages in India. It is an antiseptic and has many other qualities. Whether ingested or applied, the benefits of turmeric are plenty. Some health benefits of Turmeric are discussed in Table 1.

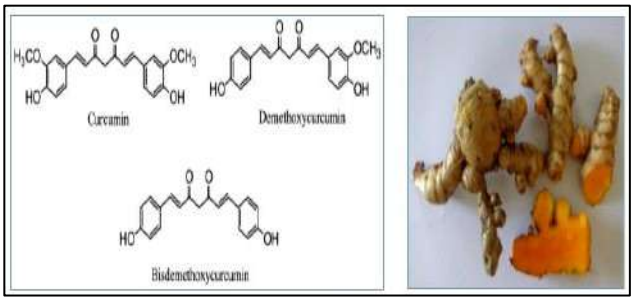

Figure 1. Chemical structure of the active constituents of turmeric

The potential use of Turmeric and its extracts in SARS-COV-2 treatment

Pandemic SARS-CoV-2 (Severe acute respiratory syndrome coronavirus 2) has spread rapidly across the globe since Dec, 2019. So far, no particular medication/ Vaccine have been endorsed for its cure or prevention although anti-retroviral capsules and hydroxyl-chloroquine etc. utilized so far for the cure (Lai *et al*, 2020). Numerous curcumin derivatives are having evidence for anti-viral properties. Neuraminidase activation assay showed that five active curcumin ingredient derivatives decreased H1N1 induced neuraminidase activation in H1N1 infected lung epithelial cells (Gupta, *et al*, 2020). Tetramethyl l curcumin and curcumin even down-regulates the nucleoprotein expression. Richart et al. in 2018 located that monoacety l curcumin and curcumin inhibited influenza virus contamination via different pathways. Significant antiviral activities of turmeric towards the H5N1 virus in Madin-Darby dog kidney (MDCK) cells in vitro by interfering with viral hemagglutination (HA) activity is also determined (Gupta *et al*, 2020) which may be beneficial for the recent pandemic condition. The effects of the anti-H5N1 virus with the aid of turmeric extracts have been demonstrated with the up regulation of the TNF-α and the IFN-β mRNA expressions inside the examined MDCK cells that are robust anti-viral agents (Gupta *et al*, 2020, Lai *et al*, 2020). Curcumin is also useful in other viral issues like AIDS because of its inhibitory action over HIV protease and integrase. Other viruses include hepatitis B, hepatitis C, zika, chikungunya, dengue etc. additionally have an inhibitory effect due to curcumin. Respiratory destress syndrome with fulminant hyper cyto-kinemia and multi-organ failure is the leading cause of mortality with COVID-19 (Gupta *et al*, 2020, Lai *et al*, 2020). Curcumin has been located to minimize Influenza virus prompted lung tissue injury using blocking off the NF-κB signaling and inhibiting the manufacturing of inflammatory cytokines (Gupta *et al*, 2020). Curcumin is also herbal ligand of PPAR-γ, which represses the inflammatory process through lowering cytokine manufacturing; thereby it may play a function in defensive lung injury related to SARS-CoV-2 infection (Gupta *et al*, 2020, Lai *et al*, 2020).

Table 1. Potential health benefits of Turmeric

Turmeric health benefits	Explanation
Relief from Arthritic Pain	Turmeric's anti-inflammatory properties treat osteoarthritis and rheumatoid arthritis. The antioxidant also destroys the free radicals in the body that damage the cells.
Good for the Brain	Research has found that curcumin promotes repair in the stem cells of the brain - the same stem cells that can help in the recovery from neurodegenerative diseases like stroke and Alzheimer's.
Aids in Digestion	The major components of the spice stimulate the gallbladder to produce bile, instantly making the digestive system more efficient. It is also known to reduce symptoms of bloating and gas.
Healing properties	Its natural antiseptic and anti-bacterial properties make it an effective disinfectant. The powder can be sprinkled on the affected area to help it heal faster.
Turmeric & Diabetes	The anti-inflammatory and antioxidant properties of curcumin have been found to delay the onset of Type 2 Diabetes in people with pre-diabetes. It further helps moderate insulin levels and boosts the effect of medications that treat diabetes.
Boost Immunity	Lipopolysaccharide - a substance in turmeric with anti-bacterial, anti-viral and anti-fungal agents helps stimulate the human immune system.
Helpful in preventing heart disease	Consumption of turmeric regularly is effective in keeping the heart-healthy. This happens due to the anti-oxidant properties present in this herb. According to some studies, this ayurvedic medicine has also been proved to reduce obesity and bad cholesterol from the body and thus improving overall heart health.

Helpful in keeping liver health	Turmeric is effective in increasing the production of vital enzymes, which help detoxify the blood and thus help in reducing toxins from the body. Consumption of turmeric also helps in improving the blood circulation, which is important for keeping the liver healthy and perform its functions properly.
Helpful in the prevention of cancer	Turmeric contains curcumin, which is also helpful in the prevention of numerous kinds of cancers and tumours. This substance not only helps in the prevention of cancer but also suppresses the initiation, progression and even metastasis of different kinds of tumors and cancers.
Helpful in reducing menstrual pain	Consumption of turmeric has been found effective in not only dealing with the period related pain, but it is also effective in dealing with other premenstrual symptoms that women may experience during that time of the month.

Conclusion

For hundreds of years, Turmeric has been used as a catalyst for safety and protection profiles. Owing to its promising efficacy in Influenza A viral infections mediated by regulating immune response to prevent harm to pulmonary tissue, well defined randomized studies may be taken up by researchers to assess the efficacy of turmeric derivatives against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) to overcome this pandemic.

Reference

Aggarwal, B.B., Sundaram, C., Malani, N & Ichikawa, H (2007). Curcumin: the Indian solid gold. The molecular targets and therapeutic uses of curcumin in health and disease *Springer, Boston, MA.* (pp. 1-75).

Mythri, B.R., Srinivas, M & Bharath, M (2012). Curcumin: a potential neuroprotective agent in Parkinson's disease. *Current pharmaceutical design*, 18(1), 91-99.

Gupta, H., Gupta, M., & Bhargava, S (2020). The potential use of Turmeric in COVID-19. *Clinical and Experimental Dermatology.*

Lai, Y., Yan, Y., Liao, S., Li, Y., Ye, Y., Liu, N & Xu, P (2020). 3D-quantitative structure-activity relationship and antiviral effects of curcumin derivatives as potent inhibitors of influenza H1N1 neuraminidase. *Archives of Pharmacal Research*, 1-14.

Mehla, J., Reeta, K.H., Gupta, P., & Gupta, Y.K (2010). Protective effect of curcumin against seizures and cognitive impairment in a pentylenetetrazole-kindled epileptic rat model. *Life sciences*, 87(19-22), 596-603

Richart, S.M., Li, Y.L., Mizushina, Y., Chang, Y.Y., Chung, T.Y., Chen, G.H & Hsu, W.L (2018). Synergic effect of curcumin and its structural analog (Monoacetylcurcumin) on anti-influenza virus infection. *Journal of food and drug analysis*, 26(3), 1015-1023.