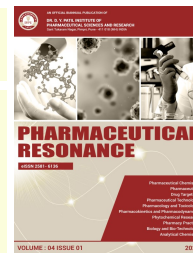




## REVIEW ARTICLE

## THE MEDICINAL PROPERTIES OF EDIBLE BIRD'S NEST - A MINI REVIEW



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**ABSTRACT :** An edible bird's nest is a popular and nutritious food that is well known in the middle Chinese society. Made with saliva swiftlets. A variety of foods are eaten reasons, including a health tonic, color enhancement, anti-depressant and immune system enhancement. It contains both macronutrients and micronutrients such as carbohydrates, glycoproteins, calcium, sodium, magnesium, zinc, manganese, iron and others. To date, many studies have reported on the health benefits of EBN use. Therefore, this review describes the different therapeutic values of EBN .

**Keywords :** *Swiftlets, EBN, macronutrient, enhancement, micronutrient .*

### 1. INTRODUCTION :

The nest of edible birds (EBN), also known as "Caviar of the East", is a delicacy known to Chinese society for its nutritional value and medicinal properties<sup>[1]</sup>. EBN is made from the saliva of small birds living in caves known as swiftlets found mainly in Southeast Asia, including Malaysia<sup>[2]</sup>. The first use of EBN dates back to the Tang Dynasty(618 - 907 A.D.) where it was presented to the emperor's courts as a great delicacy. Since then, the medicinal benefits of EBN have been meticulously reported, and it became well-known as one of the main tonics in Traditional Chinese Medicine during the late Ming (1405-1433 AD) and early Cing (1644-1911 AD) Dynasties<sup>[1, 3]</sup>. Because of its scarcity again Discovery, EBN was considered a symbol of wealth, power and prestige<sup>[3]</sup>. For centuries EBN has been used as a health tonic, complexion enhancer, asthma alleviator and immune system enhancer<sup>[2]</sup>. calcium, sodium, magnesium, zinc, manganese and iron<sup>[2,3]</sup>. EBN contains many organic substances that have health-promoting effects such as glucosamine, lactoferrin, sialic acid, amino acids, fatty acids, triacylglycerol, vitamins, minerals and other antioxidants<sup>[3-5]</sup>. Although many of the health effects are said to be

associated with the use of EBN, the mechanism of action is unknown and there is no clinical evidence to support those claims. This document aims to provide a detailed description of EBN and its therapeutic effects, with the help of recent evidence-based evidence for the benefits of EBN use.

### 2. MEDICINAL EFFECTS OF EBN

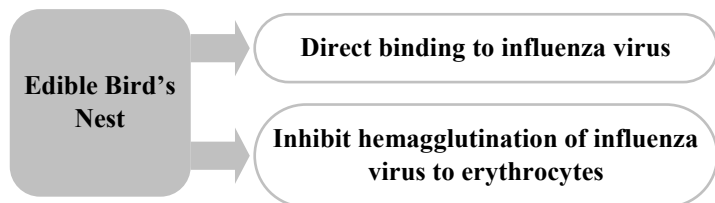
#### 2.1 Antiviral properties of EBN

In 2006, a study was conducted to evaluate the effectiveness of natural antiviral and home-grown EBN [4]. Studies have shown that the release of EBN can effectively prevent the spread of influenza outside its human species, birds, and pigs, by directly binding the flu virus itself or preventing the spread of the virus to human erythrocytes (Figure 1). In addition, EBN has been found to reduce viral infection in Madin-Darby canine (MDCK) kidney cells. In experiments, EBN-treated protease pancreatin release was shown strong antibacterial activity, indicating that low cell peptides (10 - 25kDa sialyl glycoprotein) are counted as EBN antibodies. On the other hand, the release of EBN-treated neuraminidase (NA), which breaks down deadly sialic acid residues, results in a decrease in EBN / viral binding activity. This implies that the virus's ability to bind EBN is linked to the presence of sialic acid. In general, antimicrobial activities in EBN wildlife were higher than those built in the EBN home. It was proved that. The main antiviral effect of EBN was mediated by sialyl glycol compounds and Neu5Ac2-3Gal compounds. Studies have concluded that EBN may be a safe and effective natural resource for preventing the spread of influenza. However, detailed vivo effects of HIV inhibition by EBN should

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be evaluated. Later in 2008, Yagi et al., Reported the existence of in glycosylation in EBN also suggested that salivated high antennary N-glycans of EBN, in particular, tri-antennary N-glycan with 2,3-N-acetylneuraminic acid residues, have been shown to prevent infection.



Antiviral EBN is also based on a 2016 study by Haghani and colleagues [5]. Bioactive sialic acid or thymol derivatives in EBNs have been shown to effectively inhibit IAV strain virus A / Puerto Rico / 8/1934 (H1N1) by reducing intracellular NA and extracellular non-structural protein 1 (NS1) genes needed for the onset of viral infection and recurrence, respectively. However, these effects were only seen in untreated EBN. EBN receiving enzymatic treatment (either pancreatin or NA) did not show an effect on the type of NA, whereas EBN treated with pancreatin showed an increase in the number of copies of NS1 higher and reduced immunomodulatory properties [6]. These comments suggested that some of the amino acids of EBN could cause an increase in viral activity. On the other hand, EBN has shown improvement in the effect of influenza infection on BALB / c mice by altering immune responses by strongly altering cytokines patterns, such as the onset of inflammatory response and immune-regulated immune system, depending on the stages of infection. In addition, previous treatments with EBN have shown antibodies to mice. EBN containing more the amount of acetylated sialic acid (Neu 2,4,7,8,9Ac6) has shown better antiviral activity regardless of location. It is recommended, however, to check the file for bioactive metabolites of EBN prior to use as an alternative to antimicrobial treatment in clinical trials as the origin of EBN and types of swiftlets may affect the formation of EBN.

## 2.2 Anti-oxidant properties of EBN

In addition to its anti-bacterial activity, EBN is also well known for its antimicrobial properties. In vivo studies were performed to determine the antioxidant and anti-inflammatory effects of EBN on high-fat diet (HFD) which reduced oxidative and inflammatory in rat models [7]. The results showed that EBN reduced oxidative stress caused by HFD and inflammation by transcribing the regulation of hepatic antioxidant-related viruses and inflammation; and the results were better than Simvastatin, a well-known lipid-reducing drug. In conclusion, this research promoted the use of EBN as a supplement to prevent obesity-related

inflammation and oxidative stress. EBN's ability to reduce oxidative stress is believed to be due to its antioxidant content, as shown in a study by Yida et al. [8]. EBN samples were first incorporated into a digestive model, and the samples were digested and tested for their antioxidant activity. The results showed that minced samples showed potent antioxidant activity that contributed to oxidative reduction symptoms of depression. Similarly in another study, EBN showed a protective effect of hydrogen peroxide-induced toxicity on SH SY5Y cells [9]. Hydrogen peroxide is a chemical that brings energy oxidative stress on cells. The protective effect of EBN has shown that it has the ability to release free radicals and reduce potent forms of oxygen, thereby reducing oxidative stress. Hou et al., Also suggested that EBN's antioxidant properties be given to its components, namely lactoferrin and Ovo-transferrin [9].

## 2.3 Neuroprotective effects of EBN

Several studies have investigated whether the neuroprotective effects of EBN have been reported. Hou et al., Showed that EBN reduced cortical and hippocampal neurodegeneration in ovariectomized mice [10]. The data obtained showed that EBN support improved estrogenic dysfunction by reducing glycation end-serum dysfunction and lower levels of euro-degeneration and apoptosis in the hippocampus and frontal cortex. Similar findings were observed in other studies in which EBN was awarded neuroprotective effects that eliminate the damage caused by 6-hydroxydopamine dopaminergic neurons primarily by preventing apoptosis. Therefore, it can be concluded that EBN is possible acts as a novel treatment for neurodegenerative diseases such as oxidative-stress such as Alzheimer's disease and Parkinson's disease [11].

## 2.4 Effects of EBN on cardiometabolic diseases

To date, several studies using HFD or ovariectomized rat models have reported that EBN may have positive effects on cardiometabolic diseases such as diabetes and cardiovascular disease (CVD) [12 - 14]. HFD and hormone deficiency in ovariectomized mice induce metabolic indices (such as leptin increases and adiponectin decreases) and lipid profile. This will cause hypercholesterolemia and insulin resistance, a condition that contributes to an increased risk of developing cardiometabolic disorders. Adiponectin and lectin are both important regulators of lipid metabolism and coagulation, where high metabolic indices are indicated by high levels of adiponectin and low levels of leptin. In these studies, EBN has been shown to improve lipid profile and metabolic signals in mice, compared with groups that can be treated and administered by Simvastatin [12 - 14].

The effects may have been mediated by coagulation-related genes and insulin signalling genes.

## 2.5 Effects of EBN on bone regeneration

The effects of EBN on bones and cartilage were also investigated in several studies. Matsukawa et al., Has shown that ovariectomized-fed mice fed with EBN improved femur strength associated with increased skin size [15]. It was also observed that EBN administration of EBN was more productive in mice with higher body weight and femur calcium higher, phosphorus and hydroxyproline concentration compared to the control group. In general, ovariectomized mice given with high EBN supplementation showed significant results improvement compared to mice given low EBN support. However, EBN administration did not affect serum estradiol concentration. Skin samples collected from mice were included with Masson's trichrome dye to test the size of collagen fibrils. Results from histological studies show that EBN treatment was able to increase skin tension. In summary, EBN support can increase strength and improve skin aging (as thinning of the skin layer is associated with skin aging in human studies). The findings are consistent with ancient Chinese texts, where EBN is believed to improve skin appearance [16]. In a study conducted at *Drosophila melanogaster*, Hu et al., Also described the anti-aging effect of EBN that it would increase the activity of antioxidant enzymes, energy and longevity, and decrease mortality and lipid peroxidation [17]. In addition, EBN research as a chondro-protective agent was performed without in vitro using articular chondrocytes isolated from the knee joints of four patient's osteoarthritis [18]. The addition of EBN to cell culture slows the progression of osteoarthritis and aids in cartilage regeneration. In addition, EBN reduces structural functions and increases the synthesis of extracellular matrix synthesis. Therefore, all of these conditions will be helpful in reducing osteoarthritis and therefore it was considered that EBN is a nutraceutical agent treatment of osteoarthritis.

## CONCLUSION

The use of EBN has been shown to bring many health benefits including antiviral, antioxidant and neuroprotection. It also helps to develop cardiometabolic diseases as well as bone degeneration. However, many of these health effects have been described in a few studies. Additional verification is required not only to verify the findings but also to investigate the underlying mechanisms.

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