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Baiza-e-murgh (Gallus gallus domesticus), an important food product of animal origin and its uses as Ghiza-e-Dawai: A review

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Abstract

Baiza-e-murgh (Gallus gallus domesticus), an Arabic name of hen egg, an animal product food, Hen's eggs have high nutrient value. Hen's egg is best amongst the eggs laid by other birds and reptiles. Its *Mizaj* is also best suitable to *Mizaj* of humans. *Baiza-e-murgh* is a complete food; it contains all the elements required by the body. It consists of water 50%, vitelline 16%, inorganic salt 1.5%, oil globules and fat 30%, Sulphur and phosphorus contained in a sac or bag. The *Baiza-e-murgh* is surrounded by a 0.2–0.4 mm thick calcareous and porous shell. The egg has three main parts, yolk, white and shell. Its uses in food and medicinal purpose, Unani system of medicine, It is used in Asthma, Chronic Cough, Haemoptysis, Epistaxis, Tuberculosis, Gonorrhoea, Leucorrhoea, Polymenorrhoea, Menorrhagia, Sexual Weakness, Premature Ejaculation, and Incontinence of Urine. Pharmacological activity, Antimicrobial activity, Antiviral activity, Antigenic activity, Antihypertensive activity, Anti-cancer treatment, Immune modulation and activation, Antioxidant activity.

Keywords: *Baiza-e-murgh (Gallus gallus domesticus)*, Biological description, Vernacular names, Unani classical literature, Pharmacological activity

Introduction

Baiza-e-murgh (Gallus gallus domesticus) belongs to the family phasianidae. It is an important component of the human diet. It consists of water 50%, vitelline 16%, inorganic salt 1.5%, oil globules and fat 30%, Sulphur and phosphorus contained in a sac or bag. Agitated with water it forms a milky emulsion. It is coagulated by heat and by alcohol [1] *Baize murgh* is composed of a central yolk surrounded by the albumen (egg white), egg shell membranes, calcified eggshell and cuticle [2] In the Unani literature, hen's egg has been described by the name *baize-e-murgh*. The egg laid by mature hens in spring season is considered best. In hot climate, eggs are put in salt to prevent them from decaying. Hen's eggs have high nutrient value & Hen's egg is best amongst the eggs laid by other birds and reptiles. Further, its *Mizaj* is also best suitable to *Mizaj* of humans. The egg has three main parts. The inner most part is yellow known as the yolk it is surrounded by whitish aqueous part which is albumin, and the outermost part white hard fragile is also known as *Post-e-Baiza murgh* (shell). Oil extracted from *zardi baize-e-murgh* known as the *Roghan-e-Baiza-e-murgh*. *Baiza-e-murgh* is a complete food; it contains all the elements required by the body. It is easily digestible and possesses nutritive, tonic, hematinic, expectorant antitussive and aphrodisiac properties. The white of eggs is astringent and it is used for healing wound and burns. Albumin water is indicated in haemoptysis, dysentery and other diseases involving irritation or inflammation of the alimentary canal. The oil extracted from egg yolk is used for the growth of hair, for stimulation of erectile power and as an embrocation for maturing abscesses. If a child is made to sit on egg-yolk, it will be absorbed from rectum and child health improves. Eggs are mixed with honey and vinegar to form a useful application for cleaning blemishes and freckles of face and for relief in swelling on joint and inflammation. They are made into *Halwa* with sugar and clarified butter for use as restorative and sexual tonic. Calx or *Kushta* is prepared by incinerating the shell. It is aphrodisiac, anti-diabetic antispasmodic and of value in spermatorrhoea nocturnal emission

and leucorrhoea. Egg shell powder is used in epistaxis, urticarial, skin diseases, eye diseases, and for healing wound. Hen egg has listed among Avicenna is tract on cardiac drugs [3, 4]. *Post-e-Baiza murgh* is used in Unani system of medicine. It is used in Asthma, Chronic Cough, Haemoptysis, Epistaxis, Tuberculosis, Gonorrhoea, Leucorrhoea, Polymenorrhoea, Menorrhagia, Sexual Weakness, Premature Ejaculation, and Incontinence of Urine. It is particularly used in Spermatorrhoea and to reduce excess secretions [1, 2, 4, 5, 7].



Scientific classification

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Galliformes
Family	Phasianidae
Genus	Gallus
Species	G.gallus
Subspecies	G.g.domesticus

Biological description of *baiza-e-murgh*

The *Baiza-e-murgh* is surrounded by a 0.2–0.4 mm thick calcareous and porous shell. Shells of chicken eggs are white-yellow to brown, ducks are greenish to white, and those of most wild birds are characteristically spotted. Two membranes (inner and outer) that adhere closely line the inside of the shell. At the egg's large end, the two membranes split apart to create an air pocket known as an "air cell." The air cell can be used to assess the age of eggs since it has a diameter of approximately 5 mm in fresh eggs and becomes larger during storage. Two membranes (inner and outer) that adhere closely line the inside of the shell. At the egg's large end, the two membranes split apart to create an air pocket known as a "air cell." The air cell can be used to assess the age of eggs since it has a diameter of approximately 5 mm in fresh eggs and becomes larger during storage. The egg white, also known as albumen, is an aqueous liquid with three viscosity-varying fractions that has a slight straw-tinted. Albumen surrounds the yolk, the innermost part of the egg. The yolk is surrounded by a thin, strong layer of albumen called the chalaziferous layer, which separates into two chalazae on the opposite sides of the yolk and extends into the thick albumen. The chalazae are similar to two twisted rope-like cords that are twisted counter clockwise at the small end of the egg and clockwise

at the large end. To retain the yolk in the center, they act as anchors. The yolk and the chalazae stay together in an open egg. The germinal disc (blastoderm) is located at the top of a club shaped latebra on one side of the yolk. The yolk is made up of concentrically stacked layers of material that alternates between dark and light colors. A chicken egg weighs 58 g on average. Its main components are water (~74%), protein (~12%), and lipids (~11%). The proportions of the three main egg parts, yolk, white and shell, and the major ingredients are amino acid composition of whole egg, white and yolk [8, 9, 10].

Shell

The shell consists of calcite crystals embedded in an organic matrix or framework of interwoven protein fibres and spherical masses (protein mucopolysaccharide complex) in a proportion of 50:1. There are also small amounts of magnesium carbonate and phosphates. The cuticle, also known as the bloom, the spongy layer, the mammillary layer, and the pores are the four components of the shell structure. The outermost shell coating is an extremely thin (10 µm), transparent, mucilaginous protein layer called the cuticle, or bloom. The thin cuticle is layered over the calcareous, spongy layer, which is a matrix that makes up two thirds of the shell thickness. A tiny layer of compressed, knob-like particles that form the mammillary layer; one side of the particles is tightly adhered to the shell membrane's outer surface, while the other side is firmly bonded to the spongy layer. The two layers (48 and 22 µm, respectively) that comprise the shell membrane are each made of an interwoven network of fibers consisted of protein polysaccharides. The outer layer adheres closely to the mammillary layer. Minute pores or circular openings are the tiny pore channels that run across the entire shell (7000–17,000 per egg). The cuticle protein limits the ability of microbes to penetrate while partially sealing the pores, allowing gasses to pass through.

Albumen

A 10% aqueous solution of different proteins is referred to as the albumen, or egg white. There are very little amounts of other components. The thick, gel-like albumen differs from thin albumen in its approx. four-fold content of ovomucin. Albumen is a pseudo plastic fluid. Its viscosity depends on shearing force. The surface tension (12.5% solution, pH 7.8, 24 °C) is 49.9 dynes cm⁻¹. The pH of albumen of freshly laid egg is 7.6–7.9 and rises to 9.7 during storage due to diffusion of solubilized CO₂ through the shell. The rise is time and temperature dependent. For example, a pH of 9.4 was recorded after 21 days of storage at 3–35 °C.

Proteins

The carbohydrate moieties of the glycoprotein constituents are presented in several albumen proteins have biological activity as enzymes (lysozyme), enzyme inhibitors (ovomucoid, ovoinhibitor) and complex-forming agents for some coenzymes (flavoprotein, avidin). The biological activity might be connected to the egg's defense against microbial deterioration. Egg white protein separation is relatively easy: the albumen is treated with an equal volume of saturated ammonium sulfate; the globulin fraction precipitates together with lysozyme, ovomucin and other globulins; while the major portion of the egg white remains

in solution. This albumen fraction consists of ovalbumin, conalbumin and ovomucoid. With ion-exchange chromatography, these fractions can be further separated [8, 9, 10].

Vernacular names

Arabic; Baiza, Baizud-Dujaaj, Bengali; Anda, English; Egg, Farsi; Tukhm Murgh, Khaya Makiyan, Baiza Murgh, Gujrat; Bendun, Hindi; Anda, Konkan; Kavia, Marathi; Kavia, Sanskrit; Anda, Tamil; Mottey, Telugu; Gadda, Urdu; Tukhm-e-Murgh, Baiza Murgh [1, 3, 11].

Mizaj (Temprament)

Eggs yolk; *Murrakkabul quwa* 1^o Albumin; Cold and wet 2^o Shell (Post); Cold and dry 2^o.

Affal's (actions) in Unani classical literature

Daf-e Humuzat-e-Medi (Antacid), *Daf-e-Khushunate halaq* (Antitussive), *Daf-e-Tashannuj* (Anti-spasmodic), *Daf-e-Ziabetus* (Anti-diabetic), *Habis-ud-dam* (Haemostatic), *Moharrik-e-Asab* (Nerve stimulant), *Moharrik-e-Qalb* (Cardiac stimulant), *Muallid dam* (Haematinic), *Mubhi* (Aphrodisiacs), *Muhallil* (Anti-inflammatory), *Muharrik* (Stimulant), *Mukhrij-e- Balgham* (Expectorant), *Munbit-e-Sha'ar* (Hair growth), *Mundamil-e-Qurooh wa harq* (Healing wound and burn), *Muqawwi* (Tonic), *Musakkin* (Analgesic) [1, 3], *Muqawwi-e-Badan*, *Muqawwi-e-Bah* [5, 6].

Therapeutic uses in unani classical literature

Amraz-e- Ain (Eye diseases), *Amraz-e- Jild* (Skin diseases), *Amraz-e- Qalb* (Cardiac diseases), *Ehtelam* (Nocturnal emission), *Hafiz-e- Sehat* (Health improve), *Haraq* (Burn), *Inteshar-e- sha'ar* (Hair fall), *Kasrat-e- Tams* (Polymenorrhoea), *Muharriq-e-Bah* (Stimulation of erectile power), *Selan-ur-reham* (Leucorrhoea), *Shara* (Urticaria), *Warm-e-Mafasil* (Arthritis) *Zakhm* (Wound) [1, 3, 4] *Sil* (Tuberculosis), *Sual Muzmin* (Chronic Cough), *Salasul Bol* (Incontinence of Urine), *Suzak* (Gonorrhoea), *Zeequnnafas* (Asthma) [1] *Sur-at Inzal* (Premature Ejaculation), *Ziyabetus* (Diabetes), *Inteshar-e- sha'ar* (Hair fall), *Rua'af* (Epistaxis) [1, 4, 5, 6, 7] *Zof-e-Bah* (Sexual Weakness), *Jiryani*, *Riqqate-Mani*, *Sailan-ur-Reham* (Leucorrhoea) [3, 7]

Pharmacological activity

Antimicrobial activity

In a study by Repon *et al*, 2017, antimicrobial activity of the methanolic extract of egg shell were studied against four Gram-positive (*Bacillus megaterium*, *Bacillus subtilis*, *Bacillus cereus*, *Staphylococcus aureus*) and eight Gram-negative (*Staphylococcus aureus*, *Shigella dysenteriae*, *Shigella boydii*, *Vibrio parahemolyticus*, *Vibrio mimicus*, *Salmonella paratyphi*, *Salmonella typhi*, *Pseudomonas aureus*, *Vibrio cholerae O1*, *Vibrio cholerae O139*), and one fungal strains (*Candida albicans*). Antibacterial and antifungal potential of extracts activities were assessed in terms of zone of inhibition of bacterial growth. From the result it is observed the egg shell possess antibacterial and antifungal [12].

Valenti *et al*, 1983, 1986, and Baron, 1998 suggest that ovotransferrin antibacterial activity can result from a direct effect on the membranes of *Candida albicans* or *Salmonella enteritidis* [13, 14, 15]. This hypothesis was confirmed for OTAP-92, a cationic peptidic fragment of hen ovotransferrin which possesses unique structural moiety

similar to insect defensins. By means of self-promoted absorption, this domain can penetrate the bacterial membrane and, in conjunction with OTAP-92's polycationic properties, destroy bacteria by impairing their cytoplasmic membrane's ability to perform biological functions [16] Its strong bactericidal activity against both Gram-positive (*Staphylococcus aureus*) and Gram-negative (*Escherichia coli*) strains lead the authors to envisage therapeutically applications for this natural peptide

Lysozyme is also used extensively as a food preservative. It shows high activity against mesophilic and thermophilic spore-forming bacteria such as *Bacillus sarothermophiluste*, *Clostridium thermosaccharolyticum* and *Clostridium tyrobutyricum* [17] it is used in cheese to prevent contamination because it does not inhibit on starter and secondary cultures required for the ripening of the cheeses. Lysozyme also prevents the growth of pathogenic bacteria on refrigerated foods: *Listeria monocytogenes*, *Clostridium botulinum*, *Clostridium jejuni* and *Yersinia enterocolitica* are susceptible to the lytic activity of lysozyme [17].

Antiviral activity

Given orally or after local application, lysozyme from egg albumen is effective for a wide range of viral skin diseases: herpetic lesions, verruca vulgaris and plantaris, aphthous stomatitis, polymorphous exudative erythema, molluscum contagiosum and others [18]. Moreover, when combined with specific immunotherapy, lysozyme cures viral sinusitis or bronchitis [19] The antiviral action of lysozyme has been explained in part by its role on the precipitation of viral particles and by its immune-enhancing action on the host together with its interaction with the pathogens [20, 21] have proposed some protocols for thermal and/or chemical modification of the structure of lysozyme to increase its antiviral activity. The anti-hemagglutination activity of the fibriform glycoprotein ovomucin, shown initially against swine influenza virus, has been confirmed by against bovine rotavirus and Newcastle disease virus of poultry [22].

Antigenic activity

Tini *et al*, study, various types of Ig Y can be produced in large quantities in egg yolk by immunizing hens with specific antigens: proteins, bacteria, viruses, parasites, and toxins. Hen antibody production is a good alternative to conventional mammal antibody production because it improves the welfare of animals due to the non-invasive method of egg collection and because of the fast and simple Ig Y isolation from egg yolk [23].

The antibody activity of egg yolk is due to γ -livetins, named Ig Y: Yolk Immunoglobulin [24] Ig Y are synthesized in the hen's serum and then transferred into yolk to immunize the embryonic chicken. γ -livetin is a glycoprotein that contains heavy chains (60 – 70 k Da) and light chains (22 k Da) and represents about 3% of yolk dry matter.

Numerous applications of hen Ig Y antibodies have been evaluated in humans against dental plaque formation or against rotavirus diarrhoea in trout, to protect against *Yersinia ruckeri*, or in swine to control bacterial respiratory disease [25] Furthermore, hen Ig Y antibodies against specific proteins can be raised for biological quantification such as detection by ELISA of fungi [26].

Antihypertensive activity

Miguel *et al*. (2004) have obtained and characterized

peptides from egg albumen which decrease the inhibitory effect of enzyme of conversion of angiotensin (ECA) responsible for hypertension. Pepsin is very efficient for obtaining active (ECA and antioxidant) peptides (molecular weight lower than 3000 Da) from egg albumen. These peptides significantly diminish the blood pressure of spontaneous hypertensive rats [27].

Matoba *et al.*, study two peptides derived from ovalbumin are effective in preventing hypertension.²⁸ the first one, named ovokinin, was purified from a peptic digest of ovalbumin (residues 358-365). It is a weak bradykinin B1 agonist peptide, which lowers the systolic blood pressure in spontaneously hypertensive rats when administered as an emulsion in egg yolk [30]. The second one, ovokinin (2-7) is obtained by chymotryptic digestion of ovalbumin. When orally administered, this vasorelaxing peptide reduces the blood pressure of spontaneously hypertensive rats in a dose-dependent manner. Ovokinin (2-7) has also been used for designing peptide derivatives with activity comparable to that of synthetic anti-hypertensive drugs used clinically. The vasodilation due to ovokinin (2-7) is mediated by nitric oxide and an unknown receptor [28, 29].

Anti-cancer treatment

According to the study conducted by Gasparri *et al.*, avidin from egg albumen may be used to support certain anticancer therapies. The antitumor effect of biotin-TNF (tumour necrosis factor α), a local or loco regional anticancer medication, is enhanced by tumour avidination. Such a pretargeting process increased the binding and persistence of biotin-TNF on the surface of tumour cells *in vivo*. Furthermore, suggest that the activity of avidin as an antitumour may involve changes in host tumour relationships or host-mediated antitumour responses. Therefore, pretargeting with avidin could be a realistic possibility to improve the therapeutic index of some anticancer drugs [31].

Immune modulation and activation

Egg albumen lysozyme also impacts certain immune system components of the host, which could account for some of its documented activity: thymus hyperplasia decrease, host immunity against subchronic enterocolitis is activated, against child viral hepatitis and polyomyelitis, increase in absolute granulocyte counts after antiblastic therapy, modification of the lymphocyte responses. This last property suggests that lysozyme is of interest in cancer treatments to aid recovery from immune suppression due to anticancer therapy [32]. Lysozyme may also control the imbalances of immunity during autoimmune diseases. Human lysozyme was primarily responsible for these actions, yet lysozyme from hen egg whites has been demonstrated to work on human immunocompetent cells. Lysozyme is generally efficient even after oral administration [32] the development of bacterial drug-resistance encourages the identification of efficient immune stimulants to improve the host defense mechanisms. An active egg albumen product was obtained by fermentation with *Saccharomyces cerevisiae* and spray drying [33].

Antioxidant activity

Itoh *et al.*, study, the capacity of phosvitin from yolk for metal chelation gives to this protein remarkable antioxidant potentialities. Phosvitin contains about 110 phosphoserine

residues (50% of its amino acids), responsible for its iron binding capacity [34]. Phosvitin inhibits phospholipid oxidation catalysed by Cu^{2+} and even more by Fe^{2+} . Phosvitin is efficient up to a Fe^{2+} to phosvitin ratio of 30:1, whereas this maximal ratio is 1: 1 with Cu^{2+} . However, phosvitin loses its antioxidant capacity when oxidation is catalysed by haeminic iron. It is likely that haeminic iron cannot be chelated by phosvitin because it is buried into a porphyrin structure which limits the interaction of iron and phosphoserine residues of phosvitin [35].

Castellani *et al.* (2004) have established that the optimal conditions for iron fixation (115 μg iron/mg protein) are at pH 6.5 and Sodium chloride level of 0.15 M. When pH is fixed at 3.5, the chelation of iron is inhibited by protonation of the phosphate groups and by conformational changes in the protein. After iron fixation, the solution does not become more acidic, which inhibits the release of iron³⁶. Pasteurisation does not affect the iron-binding capacity of phosvitin, or its antioxidant property [35]. Furthermore, heating phosvitin at 110°C for 20 and 40 min does not cause the release of iron bound to phosvitin. Consequently, phosvitin could be a very important natural food antioxidant [35].

Conclusion

Baiza-e- murgh is complete animal food product, its use as *dawa-e-giza*, *baiza-e- murgh* has three parts egg yolk, albumin, and shell (post), its *mizaj* have Eggs yolk; *Murrakkabul quwa* 1, Albumin; Cold and wet 2°, Shell (Post); Cold and dry 2°. Pharmacological action in Unani classical literature; Antacid, Antitussive, Anti-spasmodic, Anti-diabetic, Haemostatic, Nerve stimulant, Cardiac stimulant, Aphrodisiacs, Anti-inflammatory, Expectorant, stimulant, Hair growth, Healing wound and burn, Analgesic. Therapeutic use of *baiza-e- murgh* like, Eye diseases, Skin diseases, Cardiac diseases, Nocturnal emission, Health improve, Burn, Hair fall, Polymenorrhoea, Stimulation of erectile power, Leucorrhoea, Urticaria), Arthritis Wound, Tuberculosis, Chronic Cough, Incontinence of Urine, Gonorrhoea, Asthma, Premature Ejaculation, Diabetes, Epistaxis, Sexual Weakness, pharmacological activity of *baiza-e- murgh* have found Antimicrobial activity, Antiviral activity, Antigenic activity, Antihypertensive activity, Anti-cancer treatment, Immune modulation and activation, Antioxidant activity. *Baiza-e- murgh* as a food product is very helpful for health protection due to its medicinal properties.

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Conflict of Interest

Not available

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