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# *Namak Ta'am* (Sodium chloride), an inorganic compound drug: A review

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**Abstract**
*Namak Ta'am* (Sodium chloride), which is also referred to as table salt, sea salt, or common salt, is an ionic compound that contains sodium and chloride ions. Its formula is NaCl and the ratio of sodium and chloride is 1:1. It is an inorganic substance. It is used in Allopathic, Ayurveda and Unani system of medicine, its many vernacular names, like table salt, common salt, *Namak Ta'am*, *Namak* etc. its obtained from sea water, Its found pharmacological and therapeutic uses in Unani classical literature. Some important Unani formulation like, Safoof namak sulemani, Habb-e-kabid nausadri, *Namak* Jalinus etc., Pharmacological activity, antiviral, antibacterial, antifungal, antioxidant, Plant growth regulator, Herbicidal, Insecticidal and Molluscicidal activity.

**Keywords:** Sodium chloride, vernacular's name, pharmacological actions and therapeutic uses in Unani classical literature, pharmacological studies on namak (Sodium chloride)

## Introduction
*Namak Ta'am* (Sodium chloride) is an ionic compound in which the sodium and chloride ions known as table salt or sea salt, common salt. It have sodium and chloride ratio 1:1, and chemical formula NaCl, It is inorganic compound. Their molar mass is 22.99 and 3.45g/mol. The use of salt (NaCl) in food technology can be explained through three general categories: processing, sensory (taste), and preservation [1]. *Namak* (Sodium chloride) is a famous inorganic compound used in Unani system of medicine. It is a brownish white compound. It is prepared by the sea water, in the sea water found 1-30 p c of Sodium chloride. It is use in Unani formulation and preservation of medicine, food and animal substances. Sodium chloride is an ingredient of our body and keeps the globulin of the blood in solution. Body is continually losing Sodium chloride through sweat, wine, tear etc. It increases the secretion of gastric juice. Sodium chloride occurs as transparent cubes or small brownish white crystal grains, odorless, of taste and neutral reaction soluble in water, isolubl in alcohol and chloroform. Unani classical literature, *namak* has found three sources; sea, rock, and plants, there are three sources of salt preparation. Known as sea salt (Samundri namak), rock salt *(Pahari namak*), plant salt (*Nabati namak*) According to Unani concept *namak* is three types, (i) *Namak Ta'am* (ii) *Namak siyah* (iii) *Namak lahory* [2-4]. However, an excessive consumption of sodium has been related to hypertension and consequently to a major risk of stroke and premature death from cardiovascular diseases. The main source of sodium in the diet is NaCl [5] Therefore, the World Health Organization (WHO) recommended to achieve a salt intake level less than 5 g/day/person for 2020 [6] Sodium chloride, also referred to as salt, is a popular dietary ingredient that does not present an undue danger when used in registered products. Throughout human history, it has been utilized as a food preservative due to its antibacterial properties. Sodium chloride is also used in a wide range of industrial, agricultural, medicinal, and public works applications. Because it is phytotoxic, it can be applied as a defoliant, herbicide, and desiccant. It can be used as an insecticide, herbicide, bactericide, fungicide, defoliant, desiccant, and molluscicide, among other pesticidal applications [7].

**Fig 1:** Crystals of Sodium chloride

**Vernaculars names:** Arabic: Maleh; Bengali: Nimok, Lesu; Burmin: Themg-dan has; Can: Dromuppu, Kadal Uppu, Uppu; Duk: Nimak; English: Common salt, Table salt, Muriate of sodium, Muriate soda; Gujrat: Mithum; Hindi: Namak, Lun, Nun; Marathi: Chemit, Meeth; Persian: Namk khurdam; Sanskrit: Lavana, Samundra Lavana, Droni lavana; Sindh: Shih yen, Lunu; Telgu: Tam and Mal-Uppu. Urdu: NamakTa'am [2-4].

**Sources**: *Namake Ta'am* is found in Nature forming 2.5 p.c of the water of the ocean. It is obtained by lixiviation of saline soil or by evaporation of seawater, when obtained from sea water known as *Samudri Namak* [2-4].

**Mizaj:** *Haar* (Hot) & *Yabis* (Dry) 2 degree [2].

**Doses:** 1-7 Masha, [2] 1 Tsf, [4] Less than5gm/day/Person [6]

**Important Unani Formulation:** *Safoof-e-Namak Sulemani*, *Safoof-e-sheikh-ur-Rais*, *Namak* Jalinus, *Habb-e-Hazim*,*Habb-e-Kabid-Nausadari* [8, 28].

**Pharmacological actions in Unani Classical Literature**
*Dafa-e-Kirim-e-shikam* (Anthelmintic), *Daf-e-Auram* (Anti -inflammatory), *Daf-e-Humma* (Antipyretic /Febrifuges), *Hazim* (Digestive), *Moharrik* (Stimulant), *Munaffis* (Expectorant), *Musakkin-e-Alam* (Analgesic/Anodyne) [2-4], *Dafa-e-Taafun* (Antiseptics), *Khasunat-e- halaq-wa-Zaban*, *Moharriq-e-Ashab* (Nerve stimulant), *Mudir-e Boul* (Diuretic), *Mughari* (Emollient), *Muhallil* (Resolvent), *Muharriq-e-Qalb* (Cardiac stimulant), *Munafa-e-Amraz-e-Dambiya* (Use in blood disorders), *Musakkin-e- Atash wa Hararat* (Thirst and heat relaxant), *Musakkin-e-tashanuj* (Anticonvulsant), *Mushil* (Purgative) [2, 4], *Qati-e-Jarasim* (Antimicrobial) [2, 4].

**Therapeutic uses in Unani Classical Literature**
*Faqr-ud-Dam* (Anemia), *Ghasiyan* (Nausea), *Haiza* (Cholera), *Humma-e-Taifudia* (Typhoid), *Humm-e-Ajamia* (Malaria fever),*Istisqa* (Dropsy), *Muqawwi* (Tonic), *Nafs-ud-Dam* (Hemoptysis), Pain after meal,*Qai* (Vomiting), *Qarooh*(Wound), *Qillatul Ma'a* (Dehydration), *Qurooh-e-Ashna ashree* (Duodenal ulcer), *Qurooh-e-Meda* (Gastric ulcer), *Saqiqa* (Migraine), *Su-e-Hazam* (Dyspepsia), *Waja-ul- Asab* (Neuralgic), *Warm-e-Asab* (Neuritis), *Zat-ur-Riya* (Pneumonia), *Zof-e-Asab* (Neurasthenia), *Zukam* (Cold) [2, 4], *Fuwaq* (Hiccough), *Niqras* (Gout), *Taqyyoh-e Lissa*, (Pyorrhoea), *Waja-ul-Uzn* (Otalgia), *Zeeq-un-Nafas* (Asthma), *Hudar* (Rheumatic pain), *Nazla*(Catarrh), *Sara* (Epilepsy), *Sudaa* (Headache), *Waja-ul-Mufassil* (Joint pain) [2-4] Hand cleaning [4].

**Pharmacological studies on *Namak* (Sodium chloride)**
**Antiviral activity**
Sodium chloride effect on virus, electrochemically activated NaCl solution (anolyte/catholyte), produced in the anode and cathode chamber of the electrolytic cell, on classical swine fever (CSF) [9]. NaCl is effective on Porcin reproductive virus and respiratory syndrome virus [10] Influenza virus, respiratory syncytical virus and the Norovirus [11].

**Antibacterial activity**
Sodium chloride effect on strain of *E. coli* $DH_5$, electrochemically activated NaCl solution (anolyte/catholyte), produced in the anode and cathode chamber of the electrolytic cell [9], According to the EPA literature, NaCl to be used for faecal bacteria E.coli and E. faecium, in swimming pools [12], Sodium chloride water dehydrate from bacterial cell by osmotic pressure anddisrupted cell die, Nacl slow bacterial growth and reduce spoilage [13] It is effective antimicrobial activity makes, Sodium chloride is oldest and most widely used preservatives, salt is used as a food preservative is prehistoric [14].

**Antifungal Activity**
In addition to its own antimicrobial activity, salt can be combined with a wide range of other antimicrobial agents. A 3% solution of salt combined with 3% ethanol and the essential oil active constituents cinnamaldehyde, citral, citronellal, menthol and eugenol, was synergistically more effective in inhibiting growth of the fungi *Aspergillus oryzae*, *Aspergillus niger*, *Penicillium Citrinum*, *Penicillium Viridicatum* and *Aureobasidium pullulans* than any single ingredient [15]. Chytrid fungus (*Batrachochytrium Dendrobatidis*) is a pathogen found on amphibian, concentration of Sodium chloride above 3000ppm was effective, and increased the survival rate of person's tree frog (*Litoria Peronii*) [16].

**Antioxidant activity**
Tunieva and Kotenkoa studied 2016, antioxidant activity of Sodium chloride in the meat According to study result meat salting initiated a decrease in the antioxidant activity, meat salting with Sodium chloride in the amount of 2.0, 3.5, 5.0% led to a decrease in the amount catalase activity by 42.6% ($p$<0.05), 52.2% ($p$<0.05), and 60.1% ($p$<0.05) respectively. Meat salting with Sodium chloride in the amount of 5% led to a decrease in the activity of glutathione peroxide by 24.6% catalase by 60.1% and superoxide dismutase by 33.7%. Increase in doses of Sodium chloride led to decrease in meat anti-oxidative activity [17].

**Herbicidal Activity**

Salt may be the oldest herbicide. The use of salt to destroy vegetation is referenced in the Bible and in classical Greek and Roman writings [18]. Salt can be used either as a selective herbicide or a soil sterilant. Its phytotoxic nature is based on osmotic stress that inhibits growth of shoots [19]. Certain plants are able to withstand salt more effectively compared to others. Beets (Beta vulgaris) have a high tolerance for salt; therefore Sodium chloride has been used as a selective herbicide on this crop to kill a wide range of weed seedlings [20]. Salt tolerant turf grasses can be effectively treated with Sodium chloride to control susceptible weeds. In particular, seashore paspalum (*Paspalum virgatum*) can withstand levels of salt that would kill most plants. Sodium chloride applied at 488 kg/ha achieved over 90% control of the perennial weed sour grass (*Paspalum conjugatum*) [21]. Goose grass (*Eleusine Indica*) also treated at 488 kg/ ha had less effective results, with 0-19% control after three weeks. In 6-8 weeks, a series of treatments provides over 50%, and in one case, nearly 80% control, which is comparable to the herbicide foramsulfuron. MSMA and metribuzin had slightly better control of goose grass than Sodium chloride, but also resulted in greater injury to seashore paspalum [22]. Smooth crabgrass (*Digitaria Ischaemum*) was over 90% controlled by Sodium chloride applied at a rate of 1,952 kg/ha [23]. Common salt is reported to be an effective soil sterilant for eradicating the noxious perennials poison ivy (*Toxicodendron Radicans*), poison sumac (*Toxicodendron vernix*) and barberry (*Berberis vulgaris*) [20].

**Plant Growth Regulator Activity**

Sodium and chlorine are essential plant nutrients in trace amounts, but are seldom limiting in most soils. Sodium chloride can be used to defoliate organic cotton [24]. A review of the literature concluded that the receptors for producing the plant hormone abscisic acid are triggered in response to Sodium chloride [19]. At lower doses of Sodium chloride, the plant stomata close to retain water, but undergo water stress at elevated concentrations of sodium. When Sodium chloride at 1% and 1.5% concentrations were used to thin organic Golden Delicious apples (Malus domestica) grown in Slovenia, russeted fruit occurred, but the amount of fruit set showed no significant difference between thinned and unthinned treatments [25].

**Insecticidal Activity**

Salt solutions have traditionally been used against ants and caterpillars[18]. Furthermore, Sodium chloride is a widely used inert ingredient in insecticide formulations, where it functions as a diluent, boosts buffering and solubility, and exhibits synergistic effects.

**Molluscicidal Activity**

Sodium chloride is recognized as a molluscicide [26, 27] and Na Clefficacy is anecdotal and application is relatively labour intensive. Sodium chloride may be applied as a slug and snail barrier around garden perimeters [27].

**Conclusion**

*Namak Ta'am* (Sodium chloride) is a ionic inorganic compound, it have found Sodium chloride ratio 1:1, its known as table salt or common salt, its obtained from sea water, it is used in Ayurveda, Unani, Siddha, Allopathic system of medicine. Its dose 5gm/person/day according to WHO, It is used pharmacological and therapeutic in Unani classical literature, Important Unani Formulation is *Safoof-e-Namak Sulemani*, *Safoof-e-sheikh-ur-Rais*, *Namak* Jalinus, *Habb-e-Kabid Nausadari*, *Habb-e-Hazim*. Sodium chloride has found antiviral, antifungal, antibacterial, antioxidant, herbicidal, plant growth regulator, insecticidal and molluscicidal pharmacological activity.

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