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# Neonatal care and breastfeeding in medieval Persian literature: Hakim Esmail Jorjani (1042-1137AD) and the Treasure of King Khwarazm: A Review

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**Abstract:** Exploring the realm of sciences and challenging the ideas, traditional medicine has always been a medium for developing medical purposes, relieving illnesses and improving quality of life. Hakim Jorjani (1042-1137 AD) compiled his comprehensive 750,000-word textbook of medicine, Zakhireyei Khwarazmshahi (*The Treasure of Khwarazm Shah*) which is considered as the oldest medical encyclopedia written in Persian. Written in circa 1112 AD, the *Treasure* has been ranked along with Avicenna's the *Canon of Medicine* and Haly Abbas's the *Liber Regalis*. Six chapters of the *Treasure* (third book) include notes on neonatal care and breastfeeding. The present article is a review of the Jorjani's teachings on the neonatal care, breastfeeding, weaning and teething along with comparisons between the *Treasure* and modern medicine in this regard.
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**Keywords:** Jorjani; the Treasure of King Khwarazm; neonatal care; breastfeeding

## 1. Introduction

Traditional medicine, owing its origin to the earliest interpretations of magic and divine events, has been formed based on the transferred knowledge between physicians over the centuries and gradually evolved by mechanical views derived from observations or experimentations (Golzari et al., 2012a,b,c; Chavoushi et al., 2012). Exploring the realm of sciences and challenging the ideas, traditional medicine has always been a medium for developing medical purposes, relieving illnesses and improving quality of life. We undoubtedly owe these achievements to many countries including Egypt, Greece, Persia, India, China, etc (Eknoyan, 1994). Herein, we introduce teachings of the 11$^{th}$- 12$^{th}$ century Persian physician, Seyed Esmail Jorjani (Known as Hakim Jorjani). His major book, the *Treasure of King Khwarazm*, contains an extensive discourse on neonatal care reflecting medical knowledge of his era. In the present article we present translation of an excerpt from the discourse to introduce Hakim Jorjani's advice on the neonatal care.

## 2. Outline biography

Hakim Jorjani was born in Gorgan (northeast of Iran) in 1042 AD (Hosseini et al., 2011). Although very little is known about his early educational life, we know that he learned jurisprudence in Neishabour from Abolqasem Qushairi (Sirjani, 1976; Safa, 1999). His biography has been published in detail (Shoja and Tubbs, 2007; Shoja et al., 2007; Hosseini et al., 2011). After having lived in Khorasan (at the moment a northeastern province in Iran), Hakim Jorjani departed for Khwarazm where he presided over a hospital and served as a physician in the court of Khwarazm Shah Qutb al-Din Muhammad ibn Anush Tigin, the Governor of the Persian province of Khwarazm and his successor, Atsiz (Elgood, 1952; Sirjani, 1976). In circa 1112 AD, Jorjani compiled his comprehensive textbook of medicine, Zakhireyei Khwarazmshahi (The *Treasure of Khwarazm Shah*) which is considered as the oldest medical encyclopedia written in Persian. Al-Aghraz-o-Tebbieh (Medical Objectives) and Khofieh Alaei (a book of long size dedicated to Ala al-Din Atsiz which can be kept in a boot) are two précis of this medical encyclopedia created by Jorjani himself for use as a manual or handbook by medical students (Moharreri, 2005). Zobdat al-Tibb (Master of Medicine) written by Jorjani was also a discourse on anatomy and medicine (Shoja and Tubbs, 2007). Despite receiving

high salary from the court of Khwarazmian dynasty, Jorjani left for Marv, located on the historical Silk Road near currently Mary in Turkmenistan, to live his last years of life in peace and tranquility (Zargari, 2005). Hakim Jorjani eventually died at the age of 95 in Merv in 1137 AD (Ashtiyani et al., 2009). Persians are still proud of his heritage; his birth date (April 19) is celebrated each year as the Medical Laboratory Day in Iran (Shoja et al., 2012).

**3. The Treasure of King Khwarazm**

At the age of 70 and with a vast knowledge of medicine and natural sciences, Jorjani compiled his inclusive medical encyclopedia using his own experience and the works of more than thirty physicians preceding him such as: Hippocrates, Aristotle, Galen, Disocorides, Rufus of Ephesus, Aaron of Alexandria, Paulus of Aegineta, Juhannitius, Masuya, Jurjis Ibn Bakhtishu, Rabban Al-Tabari, Rhazes, Avicenna, Haly Abbas, etc. To adhere to ethical principles in using sources at the time, Jorjani has appropriately referred to these sources throughout his 750,000-word encyclopedia (Tajbakhsh, 2005; Hosseini et al., 2011). According to Edward Browne (1862-1926), the *Treasure of King Khwarazm* along with Avicenna's the *Canon of Medicine* and Haly Abbas's the *Liber Regalis* are considered as "three systematic treatises dealing with the whole science and art of medicine as understood by the medieval Muslim world" (Browne, 1962). In the introduction section of the *Treasure*, Jorjani describes his aim of writing this book; "independence of the physicians in all subjects from any books" (Sirjani, 1976). The *Treasure*, at the moment, has been considered as the greatest medical encyclopedia been ever written in Persian. According to Cyril Elgood regarding subject presentation style; "the *Treasure* falls between the *Canon* [Avicenna] and the *Continens* [Rhazes]" (Elgood, 1952). He also adds "the finest text-book of medicine in the Persian language to be composed after the Mongol invasion" (Elgood, 1952).

Although Jorjani used Persian anatomical and clinical terminology throughout his encyclopedia, occasionally Arabic and even Greek terms can be seen (Tajbakhsh, 2005; Shoja et al., 2007). To confirm the precious literary value of the *Treasure*, Cyril Elgood acknowledges that "Al-Jurjani did for Persian science what the Bible did for English prose. By this great encyclopedia of medicine, he standardized medical technical terms" (Elgood, 1952). The *Treasure* and its terminology later formed the basis of the Persian scholars' new works for at least six centuries. Jorjani made significant contributions to medieval medicine and medical education; he himself translated his *Treasure* into Arabic and the book was also translated into Urdu, Hebrew and Turkish by others for it was a major medical textbook consulted by medical scholars of the era (Elgood, 1952; Rahavard, 1954; Shoja et al., 2007; Hosseini et al., 2011; Shoja et al., 2012). The *Treasure* consists of several novel physiological and clinical descriptions; connection between exophthalmos and goiter (Ljunggren, 1983), neurovascular conflict as the cause of trigeminal neuralgia (Shoja et al., 2010; Hosseini et al., 2011), anatomy of the cranial nerves (Shoja et al., 2007; Aciduman and Sems, 2009), and role of optic chiasm in binocular vision (Flamm, 2007). Mastering this book was an important graduating criterion for medical students. The *Treasure* is composed of ten books of which the third one describes health maintenance guidelines. In the fifth article of the second part of this book, six chapters include notes on the neonatal care, breastfeeding, weaning and teething.

**4. From the Treasure of King Khwarazm**

In this section, we present English translation of selected sections of the Treasure on neonatal care (Jorjani, 1976).

**4.1. *On cutting the umbilical cord and washing, rubbing and settling the child to sleep***

After delivery and separation of child, immediately cut the navel cord four fingers upper and fasten the navel gently with an appropriate and delicate thread (soft silk taffeta) in order to avoid pain and impregnate a cloth with olive oil (*Olea europaea*) and place it over the navel. It has been quoted to grind turmeric (*Curcuma longa*), dragon's blood (*Calamus draco*), sarcocolla (*Astragalus fasciculifolius*), caraway (*Carum carvi*), Corsican moss (*Alsidium helminthocorton*), myrrh (*Commiphora molmol*), and to place them all in equal quantities within the navel.

To avoid the skin from being hurt by the air or any rough materials (as everything is rough to the skin of a newborn and he/she might catch cold through the air), initially, measures should be taken to harden his/her skin in order garment and clothes not to bother him. The best measure in this regard would be immediate bathing in warmed and diluted salt water as it is pleasant for his/her skin. If the skin is so dirty that will not be cleaned by the first wash, he/she should be rewashed in the same condition and be kept from the cold.

Settle the newborn to sleep in a house that is of dim light. And every morning after recognizing that the previous night's milk has been digested, wash him/her in lukewarm water then rub [him/her] with oil (boys are rubbed with fresh oil for four months and girls with violet oil [*Viola odorata*] for two months). While settling the child to sleep, move

the cradle gently and sing a pleasant song for a while to help child fall asleep.

**4.2. *On breastfeeding***

If no contradiction for breastfeeding exists, no milk suction is more beneficial than mother's breastfeeding. However until one week or more as the mother relieves from labor pain and its associated dystemperament, it would be beneficial if another person helps breastfeeding and the mother would milk herself every day until the day she continues breastfeeding her newborn. Within a day, milk should be suctioned twice or thrice and firstly fed gradually until child begins sucking. Before feeding, drop a drop of honey or rose water (*Rosa damascena*) into his/her mouth, especially in the morning and particularly at the first time. Some people have advised on providing sugar dipped in sesame oil (*Sesamum indicum*) for two days. Every time before breastfeeding, firstly rub this compound twice or thrice on the nipple, suction some milk and later place the nipple in the baby's mouth especially in the morning and particularly if milk suction is not good, squeeze the breast gently to aid sucking in order not to hurt his/her palate and throat; and a little crying before milk suction is sometimes beneficial. Breastfeeding should not exceed more than two years.

**4.3. *On weaning infants from breastfeeding***

Weaning from breastfeeding is not appropriate in summer unless it is necessary and if it happens, children should be given materials hourly to reduce their thirst namely: cucumber (*Cucumis sativus*), zucchini (*Cucurbita pepo*) and purslane seed (*Portulaca oleracea*) juice. The best time (for weaning from breastfeeding) is spring then fall or winter and they [children] should be weaned gradually as along with breastfeeding they should be given diluted beverages followed by milksop and fried eggs and then wean them and start feeding them with above-mentioned foods. Accustom them to chicken breast and francolin until they are accustomed to eating other foods as well.

**4.4. *On teething***

They [children] should not be given things requiring more chewing in order their main material of the teeth not to recede and rub rabbit brain or chicken fat to the gums in the proximity of the tooth root to make them softer and teeth to come through the gums easily. Oil their heads and necks with the mixture of violet oil in lukewarm water and drop tepid violet oil into their ears. Occasionally, during teething period diarrhea, eye pain, itchy ears and swelling of the ears, gums and throat occur.

**5. Discussion**

Caring of the umbilical cord, bathing, massaging, breastfeeding and teething are still of the main and important subjects in infants and children health care management. The issues in modern neonatology literature including cutting and clamping umbilical cord distanced from abdominal wall (Vassay and Boles, 1975; Kirkegaard et al., 2011), covering and keeping baby from the cold and bathing baby with warm water (Sarkar et al., 2010), massaging the skin with oil and its effect on improving sleep in infants and children (Kulkarni et al., 2010), resting the baby in indirect light (Colombo and De Bon, 2011), and lullabying the newborn to sleep broadly reflect the advices given by Jorjani (Hicks, 1995; Kaminski and Hall, 1996). In contrast, bathing the baby in salt water as well as early and immediate clamping of the umbilical cord, as advised by Jorjani, is not recommended in the modern medicine (Ayaz and Efe, 2008; Andersson et al., 2011). Altogether, most of Jorjani's comments on the neonatal care would be generally echoed today.

Breastfeeding is now known to confer short-term and long-term benefits on both child and mother (Zembo, 2002). Therefore, the World Health Organization and the United Nations Children's Fund recommend exclusive breastfeeding for 6 months with continued breastfeeding along with appropriate complementary foods up to two years of age or beyond (Infant and Young Child Feeding: Model Chapter for Textbooks for Medical Students and Allied Health Professionals, 2009). From the translations of the *Treasure*, it is evident that Jorjani emphasized the importance of breastfeeding for the period of two years. Although advantages of the breastfeeding have been similarly highlighted by Jorjani's predecessors, Rhazes (ca. 865-925) and Avicenna (981-1037), the cornerstone of the concept of breastfeeding lies in the Islamic religious teachings (Dunn, 1997; Gatrad and Sheikh, 2001; Modanlou, 2008). In addition, much of what Jorjani wrote in the *Treasure* about weaning and complementary feeding, i.e. gradual feeding with animal-source foods and vegetables along with breastfeeding is reflected in accepted present-day practice (Zembo, 2002; Infant and Young Child Feeding: Model Chapter for Textbooks for Medical Students and Allied Health Professionals, 2009).

Medieval practitioners in Persia prescribed a long series of medicinal herbs for the treatment of pediatric and neonatal diseases. In his *Treasure*, Jorjani prescribed a list of medicinal herbs to be applied to the umbilical cord. Among these, turmeric (*Curcuma longa*) has antibacterial and wound healing effects owing to curcumin, its major polyphenol (Maheshwari et al., 2006; Gupta et al., 2012). Interestingly, turmeric is still commonly applied to stump after the umbilical cord cutting in some countries (Alam et al., 2008; Andrews and Dalal,

2011). Moreover, olive oil (*Olea europaea*) has been recently found as effective as dry-clean method in the umbilical cord care (Erenel et al., 2010).

Table 1. Natural substances and their confirmed effects in modern medicine described in the *Treasure* for the neonatal care

| *Common name* | *Scientific name* | *Confirmed effect* | *Administration* | *Type of neonatal care* |
|---|---|---|---|---|
| Olive oil | *Olea europaea* | Wound healing (Koca et al., 2011), antimicrobial (Pereira et al., 2007) | Topical | Umbilical cord care |
| Turmeric | *Curcuma longa* | Wound healing (Maheshwari et al., 2006), antibacterial (Gupta et al., 2012) | Topical | Umbilical cord care |
| Dragon's blood | *Calamus draco* | Wound healing (Gupta et al., 2008), antimicrobial (Gupta et al., 2008) | Topical | Umbilical cord care |
| Sarcocolla | *Astragalus fasciculifolius* | Wound healing (Dehbokri et al., 2010; Mosaddegh et al., 2012) | Topical | Umbilical cord care |
| Caraway | *Carum carvi* | Antibacterial (Iacobellis et al., 2005; De Martino et al., 2009; Mohsenzadeh, 2007) | Topical | Umbilical cord care |
| Corsican moss | *Alsidium helminthocorton* | Anthelminthic (Balansard et al., 1983) | Topical | Umbilical cord care |
| Myrrh | *Commiphora molmol* | Wound healing (Walsh et al., 2010), antibacterial (Wanner et al., 2010) | Topical | Umbilical cord care |
| Violet oil | *Viola odorata* | Antibacterial (Pränting et al., 2010; Akhbari et al., 2012), antipyretic (Khattak et al., 1985) | Topical | Skin care, teething (earache) |
| Rose water | *Rosa damascena* | Antinociceptive (Hoseinpour et al., 2011), anti-inflammatory (Hoseinpour et al., 2011), antimicrobial (Shokouhinejad et al., 2010) | Oral | Breastfeeding |
| Sesame oil | *Sesamum indicum* | Immunoregulatory (Namiki, 2007) | Oral | Breastfeeding |
| Cucumber | *Cucumis sativus* | Analgesic (Kumar et al., 2010), antimicrobial (Tang et al., 2010) | Oral | Weaning |
| Zucchini | *Cucurbita pepo* | Antimicrobial (Badr et al., 2011) | Oral | Weaning |
| Purslane | *Portulaca oleracea* | Analgesic (Chan et al., 2000), anti-inflammatory (Chan et al., 2000), antimicrobial (Elkhayat et al., 2008) | Oral | Weaning |

In addition, cucumber (*Cucumis sativus*), zucchini (*Cucurbita pepo*) and purslane seed (*Portulaca oleracea*) are now believed to possess high contents of water and iron making them proper complimentary foods (Garland, 2004; Naghii and Mofid, 2007; Murad, 2011; Singh et al., 2011). The efficacy of most natural substances prescribed in the *Treasure* for the neonatal care has been proved by the modern medicine (Table 1); however, most remain clinically unexamined. Medieval Persian writings such as the *Treasure* provide comprehensive clinical remedies from centuries of experience in the field of neonatal care, which may be helpful for testing their probable benefits for the newborns.

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