

Concept about Fertilization in Unani System of Medicine

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ABSTRACT

In ancient times, when people had no interest in inventions and discoveries, but only made gauntlets and swords to fight wars, and there were only a few wealthy families who traded, we do not expect anyone to have high-tech laboratories and study embryology and preparations to inform humanity about the different stages of intrauterine life that modern scientists discovered only a century ago. From ancient to the modern period various definitions of fertilization have been given e.g. fusion of male and female gamete to form new individual organism (zygote and *Istiqrār-i-Ḥaml*). The ancient Egyptians believe the God Aton is the creator of embryo and ancient Indians said that the embryo form after sexual intercourse. Hippocrates explained that both men and women produce both male and female semen. Aristotle explained the nature of semen. Galen stated that male seed acts as mold. In *Tibb-i-Nabawī* Prophet Muhammad (peace be upon him) answered the questions about formation of child asked by a Jewish rabbi. Arab physicians said that the semen is drawn from all parts of body and both testicles of female produce female seed. In the view of Baghdadi male semen has formative faculty to perform actions. It may not be realistic to expect Unani physicians to make the same discoveries as modern scientists. However, it is still impressive that they came very close to understanding the mystery. Moreover, it is noteworthy that Unani physicians had realistic and serene explanations about the discovery.

Keywords: Fertilization; Zygote; *Istiqrār-i-Ḥaml*; Unani.

INTRODUCTION

Fertilization (اخصاب یا باروری) is a complex sequence of coordinated molecular events that begins with contact between a sperm and an oocyte [1, 2, 3] Fertilization is the process that begins with the penetration of the secondary oocyte by the spermatozoon and is completed with the fusion of male and female pronuclei [4]. *Fertilisation* or *fertilization* also known as *generative fertilization*, *syngamy* and *impregnation*. It is define as the fusion of gametes to give

rise to a new individual organism or offspring and initiate its development [5]. Synonymously some time the word *conception* (*Istiqrār-i-Ḥaml* or استقرار حمل) is also used for fertilization [6] e.g. In Hebrew, to express conception or fertilization, passive forms of the verb *to be pregnant* (*hârâ*) is used. These forms can be translated as *to become pregnant*. In some cases, the active form of the verb has the meaning of *to become pregnant*. The Greek word for conception is *to take* or *to seize*

and in Latin, it is referred to as *concupere*. However, it is not always clear in texts where exactly the seed is implanted. For instance, an old Babylonian hymn stated that the god Enlil *left his semen in her belly*. It's worth noting that the term *belly* sometimes refers to the stomach in other contexts [7]. Now in medical dictionary *conception* is defined as the onset of pregnancy marked by implantation of a fertilized ovum in the uterine endometrium [4]. Since ancient times, humans have been fascinated by the continuous creation of new life on the earth. Archeological and anthropological evidences suggest that in ancient time, the ability to conceive was believed to be the gift of a fertility goddess who could do so without the need for sperm. In the early Middle East, people believed that a divine being could cause pregnancy by using both male and female semen. However, Greek philosophers of the 5th to 3rd century B.C. were the first to realize that reproduction followed natural laws [8]. Various theories were developed to explain how reproduction occurred. The first recorded instance of embryological research is attributed to Hippocrates (Buqrāt) (460 B.C.–377 B.C.), who wrote about obstetrics and gynecology. Joseph Needham declares that Buqrāt, not Aristotle, should be recognized as the first true embryologist. Needham credits Buqrāt with being one of the first to allude to the concept of preformationism, with the Greek physician's belief that organisms were fully formed in miniature inside germ cells. This belief helped give rise to theological embryology or the idea that various souls entered the embryo as it grew [9]. Aristotle's hematogenous theory received the most attention. According to this theory, the fertilization occurs from menstrual blood in the female uterus, caused by the male sperm which has a hematogenous origin i.e. only the male's seed contributes to forming the fetus and the female's only role in procreation is to contribute menstrual blood. *Manava-Dharma-Sastra*, a sacred law code of the Hindus written in the 13th or 14th

century B.C, contains these two rather contradictory notions. Galen (Jālīnūs) (~2nd cent A.D.) considered as the spiritual successor of Buqrāt, believed that both men and women contribute to procreation through the seeds they produce, but each containing only one principle. Jālīnūs drew inspiration from the prestigious school of medicine of Alexandria, particularly from the works of Herophilus (~300 B.C.), an anatomist who believed that women also have testes. Jālīnūs went on to assert that women's genitalia are identical to men's, but turned inwards [10]. For a period of approximately 2000 years, this theory had widespread acceptance. However, it was only about 150 years ago that the hypothesis-based reproduction theory was replaced by a science-based reproduction theory [8].

CONTRIBUTIONS OF EGYPTIANS AND INDIAN PHYSICIANS

During the old Kingdom era around 3000 BC, the ancient Egyptians were familiar with incubating bird eggs. Akhnaton, also known as Amenophis IV, praised the sun god Aton for being the creator of the embryo in a woman, the maker of the seed in man, and the giver of life to the child in the body of its mother. According to the ancient Egyptians, the soul entered the infant's body at birth through the placenta. [11, 12]

Ancient Indian embryology was quite advanced. It is believed that a brief Sanskrit treatise on this subject was written in 1416 BC. *Garbha Upanishad* is the name of this scripture, which sheds light on the ancient Hindu perspective on fertilization. According to this scripture, a favorable period for conception is needed for sexual intercourse to form the embryo from the conjugation of blood and semen (seed). The embryo is called Kalada and is one day old. [11]

In the *Bhagavad Gita*, Susruta believed that the embryo was formed from a mixture of semen and blood, both of which originated from chyle. [12]

CONTRIBUTIONS OF GREEK, ROMAN AND ARAB PHYSICIANS

The Holy Bible does not regard the woman merely as a passive vessel in which the male seed develops. She actively contributes her own seed. [7] According to Hippocrates, the famous Greek physician (about 460–377 BC), who is considered the *father of medicine* stated that everything in the world is subject to laws, including our own bodies. Male semen consists of the strongest part of the body fluids, and even a small amount of it can weaken the body considerably. The penis is connected to veins and nerves from all parts of the body. When these vessels become warm and engorged from the friction, it leads to a feeling of warmth and pleasure throughout the body. During sexual activity, the friction on the penis and the movement of the body generate heat in the fluids. This heat causes the fluids to be agitated and form foam like other fluids. In humans, this foam is the strongest and richest part of the humor. It is released from the brain into the loins and throughout the body, but especially into the spinal cord. After the semen has entered the spinal cord, it travels through the veins and reaches the kidneys. From the kidneys it travels through the testicles and then reaches the penis by a separate route, distinct from the urinary tract. Hippocrates explained that in the case of the woman, my contention is that when during intercourse the vagina experiences friction and the uterus is disturbed, an irritation occurs in the uterus, which produces pleasure and heat in the rest of the body. In addition, the woman secretes a mucus-like fluid that can enter the uterus and sometimes leak out if the cervix is dilated. Hippocrates also explains that men and women produce both male and female semen, with the man's semen being stronger. After sexual intercourse, the semen of the man and woman mix in the woman's uterus. The mixing takes place through the woman's movements in her uterus. The heat causes the mixture to condense and turn into a mass. [13]

Aristotle (Arastū) of Stagira (circa 384–322 BC), a Greek philosopher and *founder of comparative anatomy*, discusses the nature of semen. He comes to the conclusion that it is a true secretion and not a natural part that is homogeneous or heterogeneous, growth, nutrient or waste product. Arastū believes that the semen gives form to the embryo, while the material required for shaping is produced by the female. He rejects the idea that the female produces the semen and instead identifies the menstrual blood as the material from which the complete embryo is produced by the seminal fluid. [12]

Galen (Jālīnūs) believed that both males and females produce seed, but he followed Aristotle's approach and considered blood as the source of the seed. Blood is produced in the liver and certain veins and serves the body's general purposes. However, sometimes the body requires a more highly charged blood, i.e., the blood that has undergone a second distillation in the heart. Jālīnūs observed female seed in the ducts that connect the ovaries to the uterus, as well as in the "horns" of the uterus. Jālīnūs hedges his original claim by analyzing the uterus and concluding that the male seed alone cannot cover the entire surface area of the uterus, which implies that there must be female seed. Jālīnūs argues that the male's reproductive fluid is naturally stronger than the female's, enabling it to shape and mold the menstrual discharge. Therefore, the semen cannot be easily expelled once it enters the female reproductive system. While the female provides the necessary conditions for the embryo to develop, the male's semen plays a crucial role in shaping it to the best of its ability. [14]

Islam, with its rich cultural heritage and unparalleled contributions to science, philosophy, and literature, has had an indelible impact on world history. Its influence can be seen in countless aspects of modern life, from the arts and architecture to politics and economics. It is impossible to deny the profound impact Islam has had on shaping the world we live in today, and its legacy will undoubtedly continue to shape

the course of human history for generations to come. According to historian Michael Hart, the Islamic Prophet Muhammad (peace be upon him) is considered the most influential person in history, having achieved great success in both religious and secular arenas. Hart regarded him as an immensely effective political leader, and Islam as one of the world's greatest religions. The influence of the prophet remains strong and widespread even today. [15] Thauban, a freed slave of the Messenger of Allah (may peace be upon him), narrated that a Rabbi from the Jews once came to the Holy Prophet (may peace be upon him) and said that he had come to ask a question which only an apostle or one or two men besides him knew the answer to. The Holy Prophet asked if it would be beneficial for him to reveal the answer to the question to which the Jew replied that he was all ears. The Rabbi then asked about the creation of a child. The Holy Prophet explained that when a man and a woman have sexual intercourse, the reproductive substance of the man is white and that of the woman is yellow. If the male's substance prevails over the female's then a male child is created by Allah's decree, and if the female's substance prevails over the male's, then a female child is formed by the decree of Allah. The Rabbi acknowledged the truth of the Holy Prophet's words and confirmed that he was indeed an apostle. [16]

According to Abū al-Ḥasan Raban Ṭabarī, semen is believed to be produced by all parts of the body and then travel to the spine, kidneys, and eventually to the testicles. During ejaculation, the penis deposits the semen into the vagina, which then enters the uterus and mixes. This leads to fertilization and pregnancy. Similar to animals and plants, the offspring will resemble their parents. [17]

‘Alī ibn ‘Abbās Majūsī (Haly Abbas) claims that in women both testicles produce a structure that secretes female semen, which then migrates to the uterine cavity. According to Majūsī, semen of moderate viscosity and stickiness spreads into the

uterine cavity through the expulsive faculty (Quwwat Dāfi‘a) of the penis when very little menstruation has passed at that time. The uterus pays attention to the semen and deposits it in the lower part of the uterine cavity near the cervix with the help of the retentive faculty (Quwwat Māsika) of the uterus. He also explained that the semen from the female testes enters the uterine cavity through the vessels of the uterus and spreads and mixes over the male semen. After mixing (fertilization), it covers the entire empty space of the uterus. According to Majūsī, the mixing of male and female semen has two advantages. Firstly, the amount of male semen is not enough to cover the entire area of the uterus. However, when mixed with female semen, the amount increases, which covers most of the uterine cavity. Secondly, a membrane is formed around the fetus. According to Majūsī, male semen is thick and hot-tempered (Ḥār Mizāj) while female semen is watery and cold-tempered (Bārid Mizāj). Since male semen loses its potency due to its heat, it is essential to have female semen in an equal amount to protect the potency of embryo formation. [18]

According to Abu ‘Alī al-Ḥusayn ibn ‘Abdullāh Ibn Sīnā (Avicenna), during sexual intercourse the uterine tube contracts and raises the cervix to receive the male semen, and this tube also receives the semen from both testicles of the female. when the male's semen reaches the uterus and settles there, the first stage is that the Quwwat Muṣawwira (formative faculty) acts on the semen and begins to foam because the semen has Rūḥ Nafsānī (psychic pneuma), Rūḥ Ṭabī‘iyya (natural pneuma) and Rūḥ Ḥaywāniyya (vital pneuma). [19]

According to Ismā‘īl Jurjānī (1041-1136) semen is formed from the blood of the whole body and is synthesized in the testicles. He also claimed that the uterine tube (اوعيه منى) bends towards the female testicles to receive the female semen. He also explained that during sexual intercourse, the neck of uterus straightens to accommodate the male semen. He claimed

that the tissue of the uterus contracts during intercourse to close with the cervix due to the attraction to receive the male semen. [20]

Ibn Hubal Baghdādī (1121-1213 A.D.) describes fertilization in his book *Kitāb al-Mukhtārāt fi'l Ṭibb* that Allah created man from the semen of man and woman. However, it is more correct that the man's semen possesses the formative faculties that perform all actions at Allah's command, while the woman's semen possesses the passive faculties of imagination (*Quwwat Munfa'ila Muṣawwira*) i.e., the man's semen acts as an effective and active performer, while the woman's semen is impressionable and a passive participant. He explained that the first thing that forms when male and female semen mix is called froth. [21]

MATERIALS & METHODS

Literature related to mechanism regarding fertilization, was surveyed from various classical Unani books, journals, periodicals, manuscripts, and online citations from the subject specific websites. Collected material was then analyzed and systematized in comprehensive manner.

PROCESS OF FERTILIZATION

The literature of Unani medicine presents a view of fertilization that is similar to that described by modern scientists. Both Unani philosophers and modern scientists agree that fertilization occurs when male and female gametes mix. *Buqrāt* explains the entire process of fertilization, from the formation of semen to the development of the child. Unani physicians describe the characteristics of semen, such as its *mizāj*, strength, viscosity, and stickiness. They explain that if the semen is too viscous, it cannot cover the entire empty space of the uterine cavity, and fertilization does not occur. In order for fruitful fertilization to occur, there must be a balance between male and female seed to ensure the potency of embryo formation from the male seed. Once this balance is achieved, the zygote is

formed and is further processed by *quwwat muṣawwira*, becoming ready to accept a *mizāj*-specific shape. [22]

CONCLUSION

The process of fertilization is a part of embryology, which is the study of the formation and development of the embryo and fetus. This concept can be traced back to ancient Unani philosophers who discovered this phenomenon. However, it was almost ignored until recent times. Even the ancient Greek embryologists were familiar with the concept of fertilization. The Unani scholars of ancient times couldn't possibly discover everything, but it's amazing how close they came to understanding certain mysteries and how they spoke about it sensibly. Fertilization phenomenon mentioned in the *ḥadīth* is one of the many medical miracles. The descriptions in the *ḥadīth* are understandable to people of different backgrounds. It's remarkable that ancient scholars like Hippocrates, Arastū, Galen and Avicenna made predictions about discoveries that leading physiologists of the nineteenth century later made. While it may not be realistic to expect Unani scholars to make the same discoveries as Western scientists, it's still impressive how close they came to understanding the mystery. Additionally, it's worth noting that Unani scholars had a sensible and sober discussion about the discovery.

Declaration by Authors

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