

Embryology in The Qur'an and Hadith: Expanded Multidisciplinary Perspective

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Abstract—Development of fetus in uterus (embryology) was much mentioned in the Qur'an and hadith. Along with advances in science and technology, especially in the digital era, reinterpretation of embryology with the multidisciplinary approach between Islamic and medical sciences, especially embryology, is a challenge and a necessity so that Islamic teachings can be the right answer in overcoming the problems faced by the people. This study aims to analyze embryology in the Qur'an and hadith based on the expanded multidisciplinary perspective. This study used library research method with multidisciplinary approach between Islamic and medical sciences, especially embryology. The result of study showed that the stages of nuthfah, 'alaaqah, mudghah, and blowing of spirit already were formed within 40 days of pregnancy. These stages are more accurately retranslated as follows: nuthfah as "the conception of a part of a woman's fluid (ovum cell) by a part of male fluid (spermatozoon cell)", 'alaaqah as "resembling leech, something that attached to the surface, and something that depended", and mudghah as "resembling a chewed substance". 'Alaaqah and mudghah morphologically and functionally describe human characteristics that can be formed and influenced by internal and external factors.

Keywords—nuthfah, 'alaaqah, mudghah, embryology, the Qur'an and hadith

I. INTRODUCTION

The name of Allah has opened very many secrets of natures and His creations in the Qur'an which is very amazing. Among the scientific miracles of the Qur'an are the verses of *kauniyah* about natural phenomena [1]. One of them is about the creation of human in the uterus. These issues, among others, are mentioned in Surah Al-Thariq: 6, Al-Sajadah: 8, Al-Insan: 2, 'Abasa: 19-20, Al-Baqarah: 223, Al-Qiyamah: 37, Al-Mu'minun: 12-14, Al-Hajj: 5, and Al-Ra'du: 8 [2]. Although the Qur'an has long referred to the creation of human in the uterus (7th century), the scientific meaning of these verses has only been fully investigated in the 20th century. The long delay in interpreting these verses correctly is mainly due to inaccurate interpretation and lack of scientific knowledge [3].

The sciences and technologies can be applied to analyzing the purpose and meaning of the Qur'an text regarding the creation of human in uterus. However, when the Qur'an was revealed, creatures of one cell such as spermatozoon cell (male gamete cell) and ovum cell (female gamete/egg cell), zygote, morula, blastocyst, embryo, and fetus were unknown so the interpretation of the Qur'an text

about them is still speculative. Likewise, the translation of the Qur'an about the fetus by translator team of the Indonesian Religion Ministry was not supported by the sciences and technologies [4].

The typology of the interpretation of the Qur'an is generally divided into three groups, namely the interpretations of traditionalist quasi-objectivity, subjectivity, and modernist quasi-objectivity. The interpretation of traditionalist quasi-objectivity is the view of interpreting the Qur'an textually according to the conditions of the times when the verse of the Qur'an was revealed. The interpretation of subjectivity is the view of the interpreting the Qur'an contextually based on the overall subjectivity of the interpreter. The interpretation of modernist quasi-objectivity is a combination of traditionalist quasi-objectivity and subjectivity, namely the incorporation of textual and contextual views. Regarding the developments of sciences and technologies at the present time, it seems that it is the interpretation of modernist quasi-objectivity that are able to answer the challenges of the times [5].

In the digital era now, Muslims should be able to reinterpret the purpose and meaning of the Qur'an texts regarding the creation of human in uterus. This reinterpretation should be done with multidisciplinary approach and consider the rapid developments of sciences and technologies. In this era, scientists are so facilitated to get scientific access to the latest scientific disciplines through internet technology [6].

Many medical and social sciences can be applied in the multidisciplinary approach. The medical sciences include embryology, obstetrics, anatomy, physiology, science of nutrition, etc. The social sciences include education and psychology.

The human embryology is very relevant to be applied in analyzing the Qur'an text regarding the creation of human in uterus because it develops knowledge relating to the beginning of human life and changes that occur in uterus [7]. The obstetrics studies anatomical and physiological changes of pregnant (maternal) women and fetus, both during pregnancy and after childbirth (post partum) [8]. Anatomy and physiology contribute to studying successively the structure and function of the reproductive system. This reproductive system plays an important role in producing offspring [9; 10]. Regarding science of nutrition, the fetus needs nutrients to develop normally and optimally. The

nutritional status of pregnant women can have an impact on fetal development.

Regarding psychology, fetal development can be affected by mental status of pregnant women. Regarding education, the fetus is known to be able to learn and be affected by the environment factors.

Based on the considerations above, the research problem analyzed in this study is, How is embryology according to the Qur'an and hadith in an expanded multidisciplinary perspective?

This study aims to analyze embryology in the Qur'an and hadith based on the expanded multidisciplinary perspective. This research was a qualitative study using the library research method. This study used a multidisciplinary approach that includes Islamic religious, medical, and social sciences. Islamic sciences included the sciences of the Qur'an, hadith, tauhid, fiqh, sufism, and akhlaq. Medical sciences included embryology, anatomy, biology, physiology, obstetrics, science of nutrition, and others. Social sciences included psychology and education science. This study analyzes embryology in the Qur'an and hadith not only in the morphological aspects, but also in functional aspects.

The results of this study can be applied to develop contemporary pregnancy jurisprudence such as maternal and fetal health, abortion, unwanted pregnancies, contraception, stem cells, biomedical cloning, obligations of filial children to mothers, etc.

II. THE SCIENTIFIC REINTERPRETATION OF THE QUR'AN AND HADITH TEXT ON EMBRYOLOGY IN AN EXPANDED MULTIDISCIPLINARY PERSPECTIVE

A. Preformation Theory Versus Epigenesis theory

In its history, the early development of embryology was greatly influenced by Aristotle (around 384-322 BC), a Greek philosopher and scientist. Aristotle proposed the idea that embryo develops from formless masses. The embryo is formed from menstrual blood after being activated by male semen. Marcello Malpighi (1675 AD) thought hen's egg contains miniature chicks. Ham van Arnheim and Anton van Leeuwenhoek (1677 AD) assumed that sperm contains preformed human miniature enlarging when it enters in the female genital tract [11]. Thoughts of Malpighi, Arnheim, and Leeuwenhoek gave rise to the view of preformation. This view suggested that entire embryo or parts of the embryo have formed in semen. When a pregnancy occurs, the embryo is developed by biological forces or the embryo is arranged by assembling the parts of the embryo that has been found in semen, then developed by biological forces. Growth is only about enlarging an embryo or assembling the parts of an embryo that are available (figure 1) [12].



Fig. 1. Concept of sperm according to preformation view in the 17th century by Hartsoeker. Human miniature in the sperm is considered enlarged after the sperm enters the ovum cell. Other embryologist assumed

that the oocyte contain human miniature that are enlarged when stimulated by sperm. Source: Moore, KL, Persaud, TVN, and Torchia, MG (2016a). *The Developing Human: Clinically Oriented Embryology*. Philadelphia: Elsevier

Caspar Friedrich Wolff denied the theory of preformation in 1759, after observed that parts of the embryo developed from "globules". He observed the unincubated eggs, but could not see the embryo described by Malpighi. He proposed the concept of layers, namely the zygote cleaves to produce layers of cells that develop into the embryo. This Wolff idea formed the basis of the epigenesis theory. This theory stated that development are results from growth and differentiation of specialized cells [11]. The theory stated that the embryo occur and grow as new creature from homogeneous materials. Formation and growth occur gradually and continuously [12]. The preformation theory ended in 1775 when Lazzaro Spallanzani showed that the oocyte and the sperm were needed to begin the development of new individual. Spallanzani concluded that the sperm acts as a fertilizing agent that starts the development process [11].

Long before the preformation theory ended, the Qur'an (in the 7th century AD) actually explained the process of human formation in uterus as an epigenesis process. The stages listed in the Qur'an turn out to be in accordance with the latest scientific knowledge [12]. The fetal development is described, among others, in the Qur'an, Surat al-Mu'minun: 12-14:

وَلَقَدْ خَلَقْنَا الْإِنْسَانَ مِنْ سَلْسَلَةٍ مِنْ طِينٍ. ثُمَّ جَعَلْنَاهُ نَضِيجًا فِي بَطْنِ أُمِّهِ كَيْفَ يَكُونُ. ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَاقَةً فَنَحْنُظُنَّهَا الْعَالِقَةَ مُعْتَقَةً فَخَلَقْنَا النُّطْفَةَ مِطَاقًا فَكَسَوْنَا الْعِظْمَ لَحْمًا ثُمَّ أَنْشَأْنَاهُ خَلْقًا آخَرَ

"And indeed We have created mankind from essence of soil. Then We made essence of soil into liquid (which is stored) in a sturdy place (womb). Then We made the liquid into a lump of blood, then We made the lump of blood into a lump of flesh, and We made the lump of flesh into a bone. Then We wrapped the bones with meat. Then We made it into another creation." (Al-Mu'minun: 12-14) [13].

The Qur'an Surat al-Mu'minun: 12-14 expressly stated that human formation in the uterus takes place through the process of epigenesis. Humans are formed continuously through step by step, namely the stages of nuthfah, 'alaqah, mudghah, 'izham, lahm, and khalqan akhar. The epigenesis process of human formation is confirmed by the hadith narrated by Bukhari:

إن أحدكم يجمع في بطن أمه أربعين يوماً، ثم يكون علقة مثل ذلك ثم يكون مضغة مثل ذلك ثم يبعث الله إليه ملكاً يأربع كلمات فيكتب عمله وأجله ورزقه وشقي أو سعيد ثم ينفخ فيه الروح

[14]

"Each of you is collected in your mother's womb for 40 days, then changes to 'alaqah like that, then changes to mudghah like that too. After that, Allah sends him angels to

complete 4 things, namely his charity, death, sustenance, misery and happiness. Then the spirit is blown into him" [15].

If the word *مثل ذلك* is translated as "like that", then *nuthfah*, *'alaqah*, and *mudghah* have actually been formed within 40 days of pregnancy. This new interpretation is in accordance with the Muslim's hadith stating that the conception results have been perfectly formed after 42 nights [15]:

إِذَا مَرَّ بِالنُّطْفَةِ اثْنَتَانِ وَأَرْبَعُونَ لَيْلَةً بَعَثَ اللَّهُ إِلَيْهَا مَلَكًا، فَصَوَّرَهَا وَخَلَقَ

سَمْعَهَا وَبَصَرَهَا وَجِلْدَهَا وَلَحْمَهَا وَعَظْمَهَا (Muslim, juz IV, 1998)

"If *nuthfah* has passed 42 nights, Allah sent him an Angel to give his shape, and to create his hearing, sight, skin, flesh, and bone ..." [16]

B. *Nuthfah*

Based on the Qur'an and the hadith above, fetal growth and development are categorized into 4 stages, namely *nuthfah*, *'alaqah*, *mudghah*, and *nafkhour ruh* (blowing of spirit) [17]. The verses of the Qur'an and hadiths above stated that human development in the uterus begins in the form of *nuthfah* [7]. The word comes from Arabic which means *falls down*. The main meaning refers to the liquid left on the bottom of the bucket after it is emptied [18]. *Nuthfah* means liquid or a small portion of liquid. *Nuthfah* is comprehensive term, including male and female gametes and parts of their natural fluid environment. The term of *nuthfah* also includes zygote, morula, and the blastocyst until the event of implantation in the uterus [7].

The zygote is a very special totipotent cell. Totipotent cell are cell that can differentiate into all types of body cells. The zygote divides several times and progressively transforms into multicellular humans through cell division, migration, growth and differentiation [11]. This human body originating from the zygote can be applied to explain the concept of God's existence. The zygote can be analogous to the God's existence, while the human body, placenta, and amniotic membrane can be analogous to God's creatures. All parts of the human body, such as the feet, the hands, the head, the neck, the body, etc. and the placenta and the amniotic membrane are embryologically derived from the same cell, namely the zygote. All parts of the human body are basically a reflection of the zygote, but the zygote's own form was indisputable by humans. This can be analogous to the existence of Allah. God does not reveal its true form, appearance or form [19]. Physically, human body parts such as the feet, the hands, the head, the neck, the body, the heart, the lungs, etc. clearly differ in their forms. Essentially, the human body parts are the same because everything comes from the zygote. But if we say "Foot is zygote", then the statement is clearly wrong because the foot is morphologically not the same as the zygote. If we say "The zygote is in the foot", then the statement is also wrong because the zygote is not only in the foot, but is present in all parts of the human body, even outside the human body such as the placenta and the amniotic membrane. Although the zygote is present in all parts of the human body, the placenta and the amniotic membrane, this zygote form cannot be detected because we do not have the ability to detect the zygote forms in the human body. The thought of the concept

of the existence of Allah based on the logic of the existence of zygote in the human body is similar to the Emanation theory by al-Farabi. Al-Farabi argued that the universe (plurality of nature) arises from the One through the process of emanation [20].

C. *'Alaqah*

Nuthfah develops into *'alaqah*. According to Moore, the word *'alaqah* refers to leech or blood sucker. This term refers to the human embryo on days 7-24, when the blastocyst attaches to the uterine endometrium as the leech attaching to the skin. Just as leeches suck blood from host, the human embryo draws blood from the decidua endometrium (figure 2) [3].

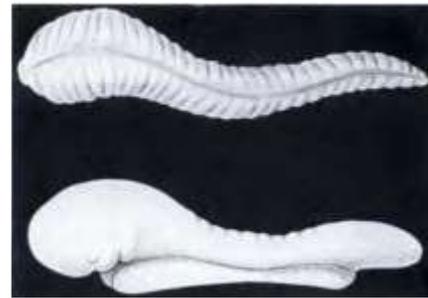


Fig. 2. A leech or blood sucker (above) and a 24-day-old human embryo (below). Note the leech-like appearance of the human embryo at this stage. Source: Moore, KL (1986). A Scientist's Interpretation of References to Embryology in the Qur'an. *The Journal of the Islamic Medical Association*, Vol. 18, 15-7

Literally, *'alaqah* means *a clot of blood, a leech, something that depends, or something that attaches to the surface* [21]. According to Husairi [15], *'alaqah* is more accurately both morphologically (anatomy) and functionally (physiology) translated as "like a leech, something that depends, and something that attaches to the surface". This term refers to the *presomite embryo* (15-22 ± 2 days of pregnancy) which morphologically looks like a leech (figure 2). The leech is a peer-shaped animal and lives by sucking blood. At this stage, the cardiovascular system begins to emerge and the embryo nutrition depends entirely on maternal blood like a leech [7]. Functionally, the embryo at this stage is also similar to leech because it is blood sucking. This leech-like nature begins when the blastocyst has entered the uterine cavity on the day 6 of pregnancy. The outer cell mass of the blastocyst called the *trophoblast* attaches and penetrates between uterine endometrial epithelial cells. The event of attaching the blastocyst to the uterine endometrium is called *implantation* [22]. This embryo shows the nature of leech parasite in sucking blood, which it is beneficial for the embryo (taking nutrients and oxygen from the maternal blood) but is detrimental to the mother (the wastes of the embryonic metabolism and carbon dioxide are discharged into the maternal circulation) [15].

'Alaqah can also be interpreted as "something attaching to the surface". According to Uddin *et al.* [4], the process of embryo attachment occurs on the day 7 of pregnancy when the blastocyst attaches to the endometrial surface of the uterus known as *nidation* or *implantation*. This process occurs before the 8-week-old embryo.

According to Husairi [15], 'alaqah can also both morphologically and functionally be interpreted as "something that depends". Morphologically, the embryo at this stage appears to depend on the endometrial wall. Functionally, the physical development of the embryo is very dependent on the maternal circulation [2]. Because embryo (fetal) growth and development depend heavily on maternal circulation, pregnant women are obligated to fulfill good nutrition, not smoking, and be careful in using drugs. Malnutrition in the mother during pregnancy will have an impact on the quality of health, immunity, and intelligence of the fetus [23,24,25,26].

D. Mudghah

'Alaqah develops into *mudghah*. *Mudghah* comes from Arabic which means the chewed substance or meat [3]. According to Husairi [15], *mudghah* is both morphologically and functionally more accurately translated as "chewed substance". This term refers to the stage of somites (23-40 ± 2 days). Morphologically, the *mudghah* stage resembles the chewed substance. Irregular surfaces show somites that resemble dental prints on chewed substances (figure 3) [7,27]. Functionally, the chewed substance can be interpreted as something that can be formed ("be printed"). The psychological development of the fetus can be formed (be affected) by the psychological state of his mother. This is evidenced by the results of research that showed that the fetus can learn, for example the fetus is heard with the sound of music [15]. Our cognitive capacity and behavior characteristics can be influenced by prenatal experiences. The factors such as maternal smoking, nutrition, stress, maternal diabetes, and others play a role in our postnatal health [22].



Fig. 3. The 23-day-old human embryo shows several somites like beads that resemble dental prints. Source: Moore, KL, Persaud, TVN, and Torchia, MG (2016b). *Before We are Born: Essentials of Embryology and Birth Defects 9th ed.* Philadelphia: Elsevier, p. 57

Physical, mental, emotional, and spiritual well-being of pregnant women have long been known to be very influential on the fetus. Severe and prolonged illness, malnutrition and mental stress, especially in the first and last few months of pregnancy can cause physical abnormalities and mental and emotional disorders throughout the life of a child. This has been accepted by the Western world which originally denied based on the assumption of the absence of any nerve fibers in the umbilical cord. Changes in the composition and balance of hormones and substances formed in a woman's body due to mental stress affect the fetus through the fetoplacental unit. Embryo is a very plastic entity, easily sculpted and formed by mother's thoughts, feelings, and actions. Conversely, pregnant women are physically and mentally very sensitive to emotional disorders. This emotional disorder will in turn be passed on to the fetus. All forms of love, assistance, guidance, and advice for pregnant women

are actually intended to make pregnant women in mental and emotional harmony. Thus, psychodynamic disorders during pregnancy, labor, and lactation can be avoided [28].

The meaning of *mudghah* describes the uniqueness of human characteristics as "something that can be formed" This meaning is emphasized in Surat al-Mu'minun: 12 which links the creation of man to soil. The soil word is referred in the Qur'an with various terms, namely *turab* (al-Hajj: 5), *ard* (earth) (Hud: 61), *tin* (clay) (As-Sajadah: 7), *tin lazib* (land concentrated clay) (as-Saffat: 11), *salsal kalfakkkhar* (clay like pottery) (al-Rahman: 14), *salsal min hama masnun* (clay from printed mud) (al-Hijr: 26) [29]. The soil term in this context is a symbol that describes humans as creatures that can be formed.

E. Blowing of The Spirit (Nafkhur Ruh)

Sayyid Qutub argued that the blowing of the spirit to the fetus occurs after fetus is completely formed. Some scholars argued that spirit are blown after the fetus is 4 months old (120 days) [30]. According to Sarwat [31], scholars generally argued that the spirits are blown when the fetus is 120 days old. This opinion is based on the hadith narrated by Bukhari above. Other scholars argued that spirits are blown when fetuse is 42 days old. This opinion is based on the hadith narrated by Muslim above.

According to Husairi [15], there is actually no conflict between the hadiths narrated by Bukhari and Muslim above. The two hadiths above indicate that spirit is blown on the fetus when it is 40 days old. If the word *مثل ذلك* on the hadith narrated by Bukhari is translated as "like that", then *nuthfah*, 'alaqah, and *mudghah* have actually been formed within 40 days of pregnancy. This new interpretation is in accordance with the Muslim's hadith stating that the conception results have been completely formed after 42 nights [15].

Determination of the blowing of the spirit to the fetus can be applied in the law of abortion. Since the spirit has been blown on the 40th day, then the law of abortion after the age without *syar'i* reasons is clearly forbidden.

III. CONCLUSION

Human development in the uterus began from the fertilization of an ovum cell by a spermatozoon cell forming a diploid single cell called the zygote. The zygote develops into the morula, the blastocyst, the embryo, and the fetus. The stages of fetal development in the Qur'an and hadith are *nuthfah*, 'alaqah, *mudghah*, *izham* (bone), *alkisa' billahm* (bone wrapping with muscles), *nasy'ah*, and *nafkhur ruh*. The stages of *nuthfah*, 'alaqah, *mudghah* and *nafkhur ruh* have been formed within 40 days of pregnancy. *Nuthfah* is more accurately translated as ovum cell fertilization by spermatozoon cell. 'Alaqah is more accurately translated as: like leech, something attaching to the surface, and something that depends. *Mudghah* is more accurately translated as "like chewed substance" The stages of fetal development functionally show human characteristics that can be formed and influenced by many factors, both internal and external.

REFERENCES

- [1] D. S. Sayska and J. Arni, "Evidences of scientific miracle of al-qur'an in the modern era," in *Jurnal Ushuluddin*, vol. 24, no. 1, 2016, pp. 79-90
- [2] A. Husairi, *Fiqh Kedokteran: Pembelajaran dengan Pendekatan Multidisipliner dari Berbagai Disiplin Ilmu Kedokteran dan Agama Islam*, Eds. 1. Malang: IRDH, 2017
- [3] K. L. Moore, "A scientist's interpretation of references to embryology in the qur'an," in *The Journal of the Islamic Medical Association*, Vol. 18, 1986, pp. 15-7
- [4] J. Uddin, A. Muzhar, M. A. Suma, H. T. Yanggo, S. Anwar, K. Nasution, M. A. Shiddiq, A. R. Yunus, and H. Cawidu, *Reinterpretasi Hukum Islam tentang Aborsi*, Jakarta: Universitas Yarsi, 2007
- [5] M. N. Zuhdi, "Hermeneutika al-qur'an: tipologi tafsir sebagai solusi dalam memecahkan isu-isu budaya lokal keindonesiaan," in *Esensia*, vol. XIII, no. 2, 2012, pp. 241-62
- [6] W. Setiawan, "Era Digital dan Tantangannya," in *Conf. National Education*, 9 Agustus 2017, Sukabumi. Retrieved Desember 2, 2019, from <http://eprints.ummi.ac.id/id/eprint/151>
- [7] K. L. Moore and A. M. A. Az-Zindani, *The Developing Human Clinically Oriented Embryology with Islamic Additions Corellation Studies with Qur'an and Hadith*. Jeddah: Dar Al-Qiblah, 1983
- [8] R. Casanova, A. Chuang, A. R. Goepfert, N. A. Hueppchen, P. M. Weis, C. R. B. Beckmann, F. W. Ling, W. N. P. Herbert, D. W. Laube, and R. P. Smith, *Beckmann and Ling's Obstetrics and Gynecology* (8th ed.), Philadelphia: Wolters Kluwer, 2019
- [9] K. S. Saladin, R. K. McFarland, C. A. Gan, and H. N. Cushman, *Essentials of Anatomy and Physiology* (2nd ed.), New York: McGraw Hill Education, 2018
- [10] K. E. Barret, S. M. Barman, S. Boitano, and H. L. Brooks, *Ganong's Review of Medical Physiology* (24th ed.), New York: McGraw Hill Medical, 2012
- [11] K. L. Moore, T. V. N. Persaud, and M. G. Torchia, *The Developing Human: Clinically Oriented Embryology*, Philadelphia: Elsevier, 2016a
- [12] H. A. S. Dhanudibroto, "Tinjauan embriologi menurut sains dan al qur'an," *Mag. Obstet. Ginek. Indon.*, vol. 11, no. 3, 1985, pp. 135-53
- [13] Depag RI, *Al-Qur'an dan Terjemahnya*, Jakarta: Yayasan Penyelenggara Penterjemah Al-Qur'an, 1985
- [14] A. Bukhari, *Shahih Al-Bukhari*, Indonesia: Dahlan, (non year)
- [15] A. Husairi, "Reinterpretasi al-qur'an dan hadits tentang embriologi," in *Caring*, vol. 1, no. 2, 2015, pp. 8-20
- [16] Muslim, *Shahih Muslim* (Cetakan I), Beirut: Dar al-Kutub al-Ilmiyah, 1998
- [17] Saifullah, *Abortus dan Permasalahannya: Suatu Kajian Hukum Islam*, in C. T. Yanggo and A. Z. Anshary, A. Hafiz (eds.), *Problematika Hukum Islam Kontemporer*, Jakarta: PT Pustaka Firdaus, 1994, pp. 113-35
- [18] M. Bucaille, *Asal-usul Manusia Menurut Bibel, Al-Qur'an, Sains*, Translator: Astuti R. Bandung: Mizan, 1992
- [19] Z. Hakamah, "Ruh dalam perspektif al-qur'an dan sains moderen," in *Universum*, vol. 9, no. 2, 2015, pp. 243-53
- [20] A. Majid, *Filsafat Al-Farabi dalam Praktik Pendidikan Islam*, 2017. Retrieved Pebruari 16, 2019, from <http://manarulquran.unsiq.ac.id/index.php/manarul/article/view/7/7>
- [21] M. I. A. Al-Marbawi, *Kamus Idris Al-Marbawi Arab-Melayu*. Indonesia: Karya Insan, (non year).
- [22] T. W. Sadler, *Langman's Medical Embryology* (14th ed.). Philadelphia: Wolters Kluwer, 2019
- [23] A. Spinillo, "Factors potentiating the smoking-related risk of fetal growth retardation," in *British Journal of Obstetrics and Gynaecology*, Vol. 101, 954-8, 1994
- [24] A. S. Al-Fanjari, *Nilai Kesehatan dalam Syari'at Islam*. Translator: A. Wijaya and T. Jumantoro, Jakarta: Bumi Aksara, 1999
- [25] Q. Alwi and R. Oemiati, "Tradisi makanan sehari-hari dan makanan pantang ibu-ibu papua selama hamil dan setelah melahirkan," in *Jurnal Kedokteran YARSI*, vol. 12, no.3, 2004, pp. 61-71
- [26] H. Wiknjastro, *Ilmu Kebidanan*. Jakarta: Yayasan Bina Pustaka Sarwono Prawirohardjo, 1991.
- [27] K. L. Moore, T. V. N. Persaud, and M. G. Torchia, *Before We are Born: Essentials of Embryology and Birth Defects* 9th ed. Philadelphia: Elsevier, 2016b
- [28] R. Soeprono, *Beberapa Catatan Mengenai Kelahiran Manusia – Menuju kepada Pengertian yang Lebih Luas*. *Obstet. Ginek. Indon.*, Vol. 10, no. 3, 1984, 127-48
- [29] S. Ja'far, *Evolusi Embrionik Manusia dalam Al-Qur'an*. *Mutawatir*, vol. 3 no. 1, 2013, pp. 25-45
- [30] Z. Alwi, "Abortus dalam pandangan hukum islam," in *Hunafa: Jurnal Studia Islamika*, vol. 10, no. 2, pp. 293-321
- [31] A. Sarwat, *Kapan Ruh Ditiupkan Ke Manusia?*, 2006, Retrieved Januari 21, 2019, from <http://www.rumahfiqh.com/>