CHAPTER III

THE INTERPRETATION ABOUT SEX DETERMINATION ON QURANIC PERSPECTIVE

This is the main of problem. It is about general understanding verse al-Insân (76): 2, such as interpretation of verses and its *mufradât*, *munâsabah* (correlation of verse to the other verse), and view of *mufassirûn* about this verse even understanding it. Besides that, it also explains about science view about sex determination, containing of Pattern of Heredity, Sex Chromosomes, and Sex Determination.

A. Description of Surah al-Insân (76): 2

Verses of this surah is disputed by scholars about the revelation period, among the opinion that this chapter entirely Madaniyah and who said Makiyah in whole, in addition to other opinions that say that some of these chapters Makiyah and some other Madaniyah. Majority of ulama believes that this surah is Makiyah. The content description is very consistent with the verses Makiyah. While there are verses that seem to speak about the situation in Medina. ¹⁰³

The most popular name of this chapter is surah al-Insân. The word is found in early passage. At the time of Prophet Muhammad pbuh, it is known better by the name of *Hal Atâ 'ala al-Insân*¹⁰⁴ which is a series of words first half of the first paragraph. There is also a chapter called *al-Dahr*. Another name for it is the surah *al-Amsyâj* because the word is found only once and in this chapter.

1. Understanding of Surah al-Insân

Fundamentals contents of Surah al-Insân is a human creation; the clues to achieve a perfect life with a straight path; fulfill *nadzar*, feed the

¹⁰³ Quraish Shihab, *Tafsir al-Misbah vol 14*, (Jakarta: Mizan, 2006), p. 650

¹⁰⁴ See Ibn Katsîr, *Tafsîr al-Qur'an al-'Adzîm*, (Maktabah Syamilah, vol.2)

عن ابن عباس أن رسول الله صلى الله عليه وسلم كان يقرأ في صلاة الصبح يوم الجمعة : ألم تنزيل وهل أتى على الإنسان الخرجه مسلم في صحيحه.

poor and orphans and those taken captive by Allah; afraid of the day judgment; do *tahajjud* prayer and patience in carrying out God's law, the reward of those who follow the instructions and threats against those who deny it.¹⁰⁵

Sayyid Qutub stated that this surah is a very gentle persuasion into obedience to Allah, sheltering Him, beseeching Him, remembering the pleasure, avoid punishment, and wary of trials. ¹⁰⁶

Al-Biqâ'i argues that the purpose of this chapter is a warning to people about what was discussed in previous chapters, surah al-Qiyâmah, which the presence of God to receive the replies and reward. This goal is evidenced by the name of this surah—al-Insân—by noticed the beginning of its creation and purpose, as designated also by another name, *al-Dahr* and *al-Amsyâj*. ¹⁰⁷

2. Asbab al-Nuzul Surah al-Insân

Generally, *asbâb al-nuzûl* surah al-Insân is when 'Ata` reported that Ibn 'Abbâs said: "It happened that 'Ali ibn Abi Thalib hired himself one night to water some palm-trees in exchange for some barley. The following morning, he collected his barley and grinded a third of it out of which they made something to eat, called al-Khazirah. When it was cooked, a poor man came begging from them, and so they gave him the food they had prepared. They then prepared a third of the remaining barley and when it was cooked, an orphan came begging from them, and they gave him the food. They then went and prepared what was left of that barley, but when the food was cooked, a prisoner from among the idolaters came to them and they fed him that food and spent the rest of the day without eating anything. This verse was revealed about this incident". ¹⁰⁸

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¹⁰⁵ See introduction Surah al-Insân in *Al Qur'an dan Terjemahannya*, (Semarang: Toha Putra), p. 1002.

¹⁰⁶ Quraish Shihab,, Tafsir..., vol.14, p. 650.

¹⁰⁷ Quraish Shihab,, *Tafsir*..., vol.14, p. 650

¹⁰⁸ Al-Wahidî, *Asbâb al-Nuzûl*, (Cairo: Maktabah al-Manar), p. 251

Indeed, *asbâb al-nuzûl* of surah al-Insân (76): 2, was not found in prophet tradition, but it was found in *shahâbah* era. Because of that, observation on *asbâb al-nuzûl* is not only interested in observing the historical facts surrounding the formation of the text, but also aimed to understand the text and produce meaning, because knowledge about the cause will generate knowledge about the result.¹⁰⁹

Some argue that this discipline has no utility since it only serves as a history. That's wrong, instead of this discipline has many uses, such as: know the aspect of wisdom that encourages the emergence of *tasyri'* law; *takhshîsh al-hukm* by those who say that the true reason for; sometimes there is a common word then there are words that serve as *takhshîsh*; and stand on the meaning and the removal of inclusiveness.¹¹⁰

However, Al-Wahidî said that it is impossible understanding tafsir of verses without knowing the history and description of own ayah. Ibn Taimiyah also stated that understanding reasons of revelation of any verses determines the detail of the own ayah because the knowledge is automatically resourced from anything which was caused.¹¹¹

Although *asbâb al-nuzûl* so important in revealing the meaning of the text, otherwise knowing for sure and convincing reasons for a large number of texts of Quran revelation is not always easy, because sometimes we find a lot of history that risen to a number of different reasons for the revelation of verse itself. ¹¹²

قال عطاء عن ابن عباس. وذلك أن علي بن أبي طالب نَوْبةً أَجَّرَ نفسه يسقي نخلاً بشيء من شعير ليلةً، حتى أصبح وقَبَضَ الشعير وطَحن تُلثَه، فجعلوا منه شيئاً ليأكلوه، يقال له: الخَزِيرَةُ. فلما تم إنضاجه أتّى مسكينٌ فأخرجوا إليه الطعام. ثم عمل الثلث الثاني، فلما تم إنضاجه أتّى أسيرٌ من المشركين فأطعموه، وطَوَوْا يومهم ذلك. فأنزلتْ فيه هذه الآيات.

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قوله تعالى: {وَيُطْعِمُونَ ٱلطَّعَامَ عَلَىٰ خُبِّهِ مِسْكِيناً....} الآية. (8)

 $^{^{109}}$ Nasr Hamid Abu Zaid, Mafhûm al-Nass Dirâsah fî Ulûm al-Qurân, p. 102.

¹¹⁰ Nasr Hamid Abu Zaid, *Mafhûm...*, p. 103

¹¹¹ Al-Suyuti, *al-Itqân fi al-Ulûm al-Qurân*, vol I, p. 28; See also, Al-Zarkasyî, *al-Burhân fi al-Ulûm al-Qurân*, vol. I, p. 23.

¹¹² Nasr Hamid Abu Zaid, *Mafhûm* ..., p. 109.

However, what should we do when we are not able to ensure, definitely and finally, *asbâb al-nuzûl?*

In answering this question, scholars of holy Qurân are also in difficulties how weighing the question of different histories, and then they made some size and requirements. That's because they have the conception that knowledge of *asbâb al-nuzûl* can only be known through *naql* and *riwâyah*, in this case there is no place for *ijtihâd*. Therefore, they limit the area of ijtihâd in a way how to face and consider the existing narrations. ¹¹³

Al-Wahidî argued, likes al-Suyuthî mentioned:

Not allowed stated about the Quran except through the transmission (riwâyah); hear from people who witnessed the incident decline in verse; the people who know the causes of the revelation, and the people who examine the causes of revelation. Other scholars say that the knowledge of asbâb al-nuzûl gained by shahâbah through qarinah of problem background. Sometimes, some of them are not set explicitly by saying: 'I guess, this verse is about this...' In addition, al-Hakim in Ulûm al-Hadits says: "When a shahâbah who witnessed the revelation and a down of Quranic verse stated that these verses down about this ..." then the news is called hadits Musnad. Likewise, Ibn Salah premises and other similar opinion were like this.

Focusing on surah al-Insân (76) verse 2, there are differentiation of scholar opinion on meaning of "amsyâj" which discussed in this chapter. Al-Thabarî stated that there are four meaning of "amsyâj," some of scholars argue that it is mixture of sperm with ovum. Said that:

(35742) حدثنا أبو كريب وأبو هشام الرفاعي، قالا: ثنا وكيع، عن سفيان، عن ابن الأصبهاني عن عكرمة: أمشاج نبتليه، قال: ماء الرجل وماء المرأة يمشج أحدهما بالآخر. (35743) حدثنا أبو هشام، قال: ثنا ابن يمان، عن سفيان، عن ابن الأصبهاني، عن عكرمة، قال: ماء الرجل وماء المرأة يختلطان.

(35744)قال ثنا أبو أسامة، قال: ثنا زكريا، عن عطية، عن ابن عباس، قال :ماء المرأة وماء الرجل يمشحان.

¹¹⁴ Al-Suyûthî, *al-Itqân fi al-Ulûm al-Qurân*, vol I, p. 31.

¹¹⁵ Al-Thabarî, *Jâmi' al-Bayan*, vol. 12, p. 354

¹¹³ Nasr <u>H</u>amid Abu Zaid, *Mafhûm....*, p. 109.

(35746)قال ثنا عبد الله، قال: أخبرنا أبو جعفر، عن الربيع بن أنس قال :إذا اجتمع ماء الرجل وماء المرأة فهو أمشاج.

(35747)قال ثنا أبو أسامة، قال: ثنا المبارك، عن الحسن، قال: مشج ماء المرأة مع ماء الرجل.

(35748)قال: ثنا عبيد الله، قال: أخبرنا عثمان بن الأسود، عن مجاهد قال : خلق الله الولد من ماء الرجل وماء المرأة وقد قال الله: يا أيها الناس إنا خلقناكم من ذكر وأنشى.

(35749)قال: ثنا عبيد الله قال: أخبرنا إسرائيل، عن أبي يحيى، عن مجاهد قال: خلق من تارات ماء الرجل وماء المرأة.

other scholar argue that "amsyâj" means chronological process which begin from nuthfah then became 'alaqah, 'alaqah became mudghah, then 'idham phase, then covering with muscle. 116 Said that:

(35750)حدثني محمد بن سعد، قال: ثني أبي، قال: ثني عمي، قال: ثني أبي، عن أبيه، عن ابن عباس: قوله إنا خلقنا الإنسان من نطفة أمشاج نبتليه الأمشاج : خلق من ألوان خلق من تراب، ثم من ماء الفرج والرحم: وهي النطفة، ثم علقة، ثم مضغة، ثم عظماً ثم أنشأه خلقاً آخر فهو ذلك.

(35751)حدثنا ابن المثنى، قال: ثنا محمد بن جعفر، قال: ثنا شعبة، عن سماك، عن عكرمة في هذه الآية: أمشاج قال: نطفة، ثم علقة، ثم مضغة ثم عظماً.

Third, the other scholars argue that "amsyâj" means variety of nuthfah. 117 Said that:

(35755)حدثني على قال ثنا أبو صالح قال ثني معاوية عن على عن ابن عباس في قوله أمشاج نبتليه يقول مختلفة الألوان.

(35756)حدثنا أبو هشام قال ثنا يحيى بن يمان قال ثنا سفيان عن ابن أبي نجيح عن مجاهد قال ألوان النطفة.

Fourth, the other scholar argued that "amsyâj" means gene that in the *nuthfah*. 118 Said that:

Al-Tabariy, *Jâmi'*..., vol. 12, p. 355. See also, Al-Zubaidi, *Tâj al-'Arus*, p.
 Al-Tabariy, *Jâmi'*..., vol. 12, p. 356.

(35760) حدثنا أبو كريب وأبو هشام، قالا: ثنا وكيع، قال :ثنا المسعودي، عن عبد الله بن المخارق، عن أبيه، عن عبد الله قال: أمشاجها عروقها. (35761) حدثنا أبو هشام، قال: ثنا يحيى بن يمان، قال: ثنا أسامة بن زيد، عن أبيه قال: هي العروق التي تكون في النطفة.

3. Tafsir Mufrodat

إِنّا خَلَقْنَا الإِنسْنَ مِن نُطْفَةٍ أَمشاحٍ نَبتَليهِ فَجَعَلْنَهُ سَمِيعًا بَصِيرًا ﴿ *Verily We created Man from a drop of mingled sperm, in order to try him: So We gave him (the gifts), of Hearing and Sight." (Al-Insân (76): 2).

Allah says:

Verily We created Man from a drop of mingled sperm (Nuthfah Amsyâj).

The word *al-Insân* to human beings in general without looking at causality of the revelation of the verse. It considered became *Mustatsnâ Minhu*¹¹⁹ of the next verse. So, the general word of *al-Insân* can give as a function of absolute clarity *al-Insân* (human being) itself.

al-Insân (human) here formed by plural, it does not refer to specific people, as has been mentioned by the previous *Mufassir*. ¹²⁰

Later, in the interpretation of the word *al-Insân* itself. In general, many *Mufassir* at some commentary books did not discuss the detail study of the truth meaning of human being (*Insân*) with various redactions that used.

There are 3 words that are used by al-Quran to show the meaning of people:¹²¹

¹¹⁸ Al-Tabariy, *Jâmi'...*, vol. 12, p. 356.

¹¹⁹ Mustatsnâ Minhu is the word excepted from the instrument of exception (Adât Isitsnâ), such as likulli Dâ'in Dawâ'un Illa al-Maut, the word of Dâ'in is as Mustatsnâ Minhu from Adât Istisnâ' Illa

al-Alûsî said that in fact the general meaning of the word *Insân* was caused by definite form (*Ta'rif*), which has function to comprehensive human (*li al-Istighrâ'*) it base on the instrument of exception (*Istitsnâ'*). Read more al-Alûsî, *Ruh al-Ma'ânî*, vol. 29, (Maktabah Syamilah, vol. 2), p. 292

- a) Using the word which is consisting of characters (*Alif, Nûn, Sin*) as the word *al-Insân, al-ins* and *al-nâs*
- b) Using the word *al-basyar*
- c) Using words al-dzurriyyat and bani Adam

Whereas the word of *al-Insân* drawn from the root word of *al-Uns*, ¹²² which means kind and harmonious. In addition, there is also the opinion that the word comes from the derivation of *Nasiya* word which means forgotten. From these meanings can be seen an image of the character or human nature itself.

The use of the word *al-Insân* in al-Qur'an is the visible as an element of humanity that can carry the load of *Taklîf*, holding trials either good or evil, have the intellectual resources, can be dialectician, be in control of trust and etcetera. There are as many as 65 verses, ¹²³

The human called also in al-Qur'an by using the redaction of *al-Basyar*. That is showing that the human is a creature in the form of material needs to eat, drink and dialectical in their life. 125

Al-Qur'an used the word of *al-Basyar* for 35 times to show the people from *Dhahiriyyah* (physical point) and similarity with all human, because the redaction of *al-Basyar* is a name for the human species. Whereas the classification was based on the use of *al-Basyar*, it's appropriate to the context of this verse. Thus, talking about human beings with various redactions (*al-Ins, al-Insân, al-Nâs and al-Basyar*) still has a certain meaning base on each context. The meaning of human and the

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¹²¹ Quraisy shihâb, *Wawasan Al-Qur'an; Tafsir Maudhu'i Atas Berbagai Persoalan Umat*, (Bandung; Mizan, 1998), p. 278

¹²² Abi Hilal al-'Askarî, *al-Furûq al-Lughawiyyah*, (Beirut; *Dâr al-Kutub al-'Amaliyyah*, chapter 26), p. 227

¹²³ M. Fu'ad Abdul Bâqî, *al-Mu'jam al-Mufris li al-Fâdh al-Qur'an al-Karîm*, p. 119.

¹²⁴ The root meaning of *al-basyar* is an appearance from something beauty and good. In the same root word arise the word of *al-basyarah*, which means skin. Therefore, human was called by the name of al-basyar because of their skin is apparent clearly and be different with the animal's. See more Quraisy Shihâb, *Wawasan Al-Qur'an*; *Tafsir Maudhu'i Atas Berbagai Persoalan Umat*, p. 278

¹²⁵ Bint al-Syâthi', Maqâl fi al-Insân Dirasah Qur'âniyyah, p. 11

various roles through thematic studies by analyzing *Siyâq al-Kalâm* (the order of a sentence) in the Qur'an paragraph. ¹²⁶

Word <code>amsyâj</code> (أمشاح) is a plural from <code>misyj</code> (مشح) which means mixture. According Al-Râzi in his master piece "<code>Tafsîr Mafâtih</code> al-Ghaib" means mixed something or mingled one. The meaning of this word can be found in several meanings, depending on when and where its use. One who said mixture between nuthfah (sperm) and ovum, also who said pattern of nuthfah (white and thick for sperm, otherwise yellow and watery for ovum), who said mixture between nuthfah and <code>haidh blood</code>.

Thanthâwî Jauharî stated in his masterpiece that nuthfah composed from *amsyâj*, the meaning of *amsyâj* is containing several elements such as oxygen, hydrogen, carbon, ozone, SO, phosphor, potassium, magnesium, calcium, iron. 127

Term "nuthfah amsyâj" is an expression of miracles in this verse. Etymologically it means a single sperm (which is very small as a drop of water), but its structure consists of a densely packed mixture. This is in accordance with scientific notes that the sperm fertilized ovum-shaped drops, but at the same time he is a mixture of the chromosomes of sperm and ovum. 128

Ibn 'Abbâs said concerning Allah's statement, مِن نُطْفَةٍ أَمْشَاجٍ (from Nuthfah Amsyâj,)

"This means the fluid of the man and the fluid of the woman when they meet and mix." Then man changes after this from stage to stage, condition to condition and color to color.

Ikrimah, Mujâhid, Al-<u>H</u>asan and Al-Rabi` bin Anas all made statements similar to this. 129

"Amsyâj is the mixing of the man's fluid with the woman's fluid." Concerning Allah's statement,

¹²⁷ Thantâwi Jauharî, *al-Jawâhir*, p. 320.

¹²⁹ Al-Thabarî, *Jâmi*'..., vol. 12, p. 354-356

¹²⁶ *Ibid*, p. 11.

¹²⁸ Yusuf al-Hajj Ahmad, Kemukjizatan Manusia dalam Al Quran dan Sunnah, p. 15

... نَّبْتَلِيهِ ...

... in order to try him, means, "We test him."

The word *bala'* was found six times in al-Qur'an, in addition to other forms of the same word. The root of this word originally meant a *reveal*, as in the word of God, "yauma tublâ al-sarâir", "on the day (of Judgement) secrets will be revealed." (Al-tariq (86): 9). However, these meanings evolved so that means *test that can reveal the quality of a faith of person.* ¹³⁰

Bala' is a necessity of life or exam. That is God, without the involvement of the test in determining the manner and form of the exam (as well as each exam). Who determines how, when and form of the exam is Allah. He said,

That He may test you which of you is best in deed. (Surah al-Mulk (67): 2)

Then Allah says,

so, We made him hear and see.

means, "We gave him the faculties of hearing and sight so that he would be able to use them for obedience and disobedience."

Word <code>samî'an</code> (سميعا) and <code>bashîran</code> (بصيرا) were <code>mubâlaghah</code> form (hyperbola). This is in addition to suggesting that humans have the privileges concerning both the potential for above other creatures, and more that can he obtained for its use in the appeal with-animals besides those two things-as well as to state that even though humans do not use all potential hearing and eyesight are granted by Allah to him then that's enough to bring him to accept and carry out Allah's guidance. ¹³¹

¹³¹ Quraish Shihab, *Tafsir...*, vol.14, p. 654

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 $^{^{130}}$ Quraish Shihab, "Musibah dalam Perspektif al-Quran", in *Jurnal Studi al-Quran, vol. I, no. 1, January, 2006.* p. 11

4. Munasabah of verses

Rising of knowledge about the theory of correlation (munâsabah) originates from the fact that the systematic of the Koran, as contained in the manuscripts Utsmânî, now is not based on chronological fact of revelation. In this connection, salaf scholars disagreed about the order of surah in the al-Quran. A party of them argued that it is based on tauqifi of the Prophet Muhammad. The second one believes that it is based on ijtihâd of the Companions after the agreement and ensure that the composition of the verses is taugifi. The third one is of the opinion is similar to the first class, unless a letter of al-Anfâl [8] and Barâ'ah [9] which are regarded *ijtihâdî*. 132

The first opinion is supported among others by al-Qadi Abu Bakr within one opinion, Abu Bakr ibn al-Anbari, al-Kirmâni, Ibn al-Hisâr. The second opinion is supported by Mâlik, al-Qâdi Abu Bakr in his opinion the other, and Ibn al-Fâris. The third opinion adopted by al-Baihaqi. One cause of this disagreement is the existence of manuscripts ulama salaf which vary in the order letter. There are set based on a chronological decrease of verses, such as the manuscripts of Ali that began with the Iqra', then the rest have been prepared on the decline (Makiyah followed by Madaniyah). The manuscripts of Ibn Mas'ûd, starting with the letter al-Baqarah [2], then al-Nisa' [4] and the letter of Alu 'Imrân [3]. 133

Based on the diversity of opinion on this systematic, fair if the problem of the correlation of Quranic theory is not received the attention of scholars who pursue in 'Ulûm al-Qurân. But, anyway, scholar who first put the attention on this issue, according to al-Suyûthî, was Syaikh Abu Bakr al-Naisaburî, then followed a few scholars, such as Abu Ja'far ibn Jubair in his book Tartîb al-Suwar al-Quran, al-Syaikh Burhânuddin

132 Rosihon Anwar, Samudera Al-Quran, p. 134.
 133 Al-Suyûthî, Asrâr al- Tartib al-Quran, (Cairo: Dar al-I'tishâm) p. 68-69.

Biqa'i in his book *Nadham al-Durar fî Tanâsub al-Ayyi wa al-Suwar*, and al-Suyûthî himself in his book *Asrâr al-Tartîb al-Quran*. ¹³⁴

Learn and know *munâsabah* of verse is a very important and occupied the main portion in the interpretation of disciplines. This is because learning this, an interpreter can make a good analysis and understanding. Therefore, there are scholars who discuss the specifics. Among them was Abu Ja'far Ahmad ibn Ibrahim in his book *Al-Burhân fî Munâsabah Tartîb Suwar al-Quran* and al-Syaikh Burhânuddin Biqa'i in his book *Nadham al-Durar fî Tanâsub al-Ayyi wa al-Suwar.* ¹³⁵

Knowing *munâsabah* among several verses in the Quran is not including things that have been set by the Quran itself, or Hadits, but fully starts from ijtihad and cleverness and foresight in capturing the secret of exegetes of the Quran. Therefore, it is very difficult to determine criteria that can be used as guidelines when determining the relationship with the verse or verses in the surah of the Quran. However, there are also some scholars who determine the general criteria that can be used as a reference. For example, if the correlation is along with the context of the editorial section and is not contrary to the rules of Arabic linguistics, it is acceptable. ¹³⁶

According to Manna' al-Qaththân, that every verse has a relationship with aspects of the previous verse in terms of the relationship that unites, such as the ratio or balance between the characteristic of the believers and of the unbelievers, between the threat and a promise to them, mentioning of the verses mercy after punishment clause, the verses that contain recommendations after the verses containing the threat, the verses of unity and greatness of God after the verses about nature. ¹³⁷

The correlation in this case is the writer restricts the verses before and after which became the study in this thesis.

¹³⁶ Rosihon Anwar, Samudera ...,, p. 135

¹³⁷ Manna' Qattan, *Mabâhits...*, p. 97.

¹³⁴ Al-Suyûthî, *Al-Itqân fi Ulum al-Quran*, (Beirut: Dar al-Fikr), vol. I, p. 108.

¹³⁵ Rosihon Anwar, Samudera ..., p. 135.

(1) Has there not been over Man a long period of Time, when he was nothing - (not even) mentioned? (2) Verily We created Man from a drop of mingled sperm, in order to try him: So We gave him (the gifts), of Hearing and Sight. (3) We showed him the Way: whether he be grateful or ungrateful (rests on his will).

Ibn Katsîr argued in his magnum opus that the first verse reminds human presences on this earth as well as explains the purpose of its creation so that they know that is not fair for them arrogant and turned away from its creator, with the statement that they ever not exist. 138

Al-Biqâ'i understand the first verse as a signal that the days were not created except for humans. 139

Furthermore, in verse two, an explanation of the initial process of its creation and purpose of life in the world, that human beings (except the prophet Jesus) was created from the mixing of sperm and ovum. 140

Therefore, humans are given a huge potential to hear and see in order to test him whether he be grateful or deny the pleasure.

B. The Reproductive System

The formation of a new individual begins with a sperm from a male and an ovum from a female. Sperm and ovum are gametes, or sex cells. They provide a mechanism for forming a new individual and mix genetic contributions from past generations. As a result, each person has unique combination of inherited traits.

Sperm and ovum are produced in the reproductive system, which is organized similarly in the male and female. Each system has paired structures, called gonads, where the sperm and ovum are manufactured. 141

¹³⁸ Ibn Katsir, *Tafsir* ...,

¹³⁹ Quraish Shihab,, *Tafsir...*, vol.14, p. 650.

Quraish Shihab,, *Tafsir*..., vol.14, p. 650.

¹⁴¹ Lewis Ricki, *Human Genetics*, p. 48

1. The Male

Sperm cells develop within a 125 meter long network of seminiferous tubules, which are packed into paired, oval organ called testes (somites called testicles). The testes are the male gonads. They lie outside the abdomen within a sac called the scrotum. Lying outside the abdominal cavity exposes the testes to a lower temperature than the rest of the body, which is necessary for sperm to develop. Leading from each testis is a tightly coiled tube, the epididymis, in which sperm cells mature and are stored; each epididymis continues to another tube, the vas deferens. Each vas deferens bend behind the bladder to join the urethra, the tube that carries both sperm and urine out through the penis. 142

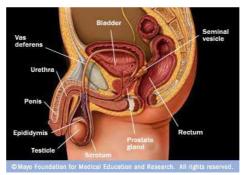
Along the sperm's path, three glands produce secretions. The vasa deferentia pass through the prostate gland, which produce a thin, milky, alkaline fluid that activates the sperm to swim. Opening into the vas deferens is a duck from the seminal vesicles, which secrete fructose (a sugar that supplies sperm with energy), plus hormonelike prostaglandins, which may stimulate contractions in the female that help sperm and ovum meet. Each about the size of a pea, the bulbourethal glands join the urethra where it passes through the body wall. They secrete alkaline mucus that coast the urethra before sperm are released. All of these secretions combine to form the seminal fluid that carries sperm. (See Fig. 2.1)

During sexual arousal, the penis becomes erect so that it can penetrate and deposit sperm in the female reproductive tract. At the peak of sexual stimulation, a pleasured sensation called orgasm occurs, accompanied by rhythmic muscular contractions that eject the sperm from each vas deferens through the urethra and out the penis. The discharge of sperm from the penis, called ejaculation, delivers about 200 to 600 million sperm cells. 144

Lewis Ricki, *Human...*, p. 48

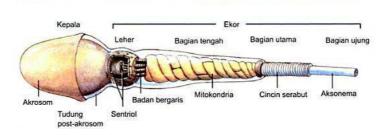
¹⁴² Lewis Ricki, *Human..*, p. 48.

¹⁴⁴ Lewis Ricki, Human..., p. 49



(Fig 2.1) The male reproductive system makes, stores and moves sperm. Testicles produce sperm. Fluid from the seminal vesicles and prostate gland combine with sperm to make semen. The penis ejaculates semen during sexual intercourse. 145

A healthy sperm cell will have a shape similar to a tadpole. Sperm consists of head, somewhat flattened oval contains the nucleus; neck, which connects the head with the middle, and tail, which can vibrate so that the sperm can move quickly. Tail length is about 10 times of head. (See Fig. 2.2)



(Fig 2.2) Structure of human sperm. Long of tail not be shown entirely.

In embryonal, the growth sequence of sperm (spermatogenesis) ¹⁴⁷:

- 1. spermatogonia, furcated;
- 2. first spermatocyte, furcated;
- 3. second spermatocyte; furcated;
- 4. spermatids, and then grow up to be;
- 5. spermatozoon (sperm).

http://www.mayoclinic.com/health/medical/IM02745, © 1998-2010 Mayo Foundation for Medical Education and Research. All rights reserved. Accessed on April 24th, 2010.

¹⁴⁶ Rustam Mochtar, Sinopsis Obstetri, p. 18

¹⁴⁷ Johannes W. Rohen, *Embriologi Fungsional 2nd Edition*, Jakarta: Penerbit Buku Kedokteran, p. 11

Male fertility depends on sperm quality and quantity, which can be affected by a variety of things. While you may not be able to control all the factors that could improve your fertility, there are steps you can take to maximize your fertility and make sure your sperm are top performers.

What factors are linked to having healthy sperm?

To achieve its goal, sperm must have three things going for it 148:

- Quantity. When ejaculation occurs, that is emitting cement, cement that comes out approximately 5 ml with a total of about 50 million sperm cells. If the sperm count of less than 20 million, then the percentage of conception is very small. However, researchers are finding that having healthy sperm (the quality) may be just as important as the total amount of sperm you produce. Of the millions of sperm in the ejaculated semen, only about 200 actually reach the egg in a woman's fallopian tube. But, just one is needed to fertilize the egg.
- Quality. It is not enough just to have enough. Sperm shape and structure (morphology) are equally important. Males are most likely to be fertile if more than one-third of their sperm are of normal shape and structure. A normal sperm has an oval head and a long tail that propel it forward. Sperm with large, small, tapered or crooked heads or kinky, curled or double tails are less likely to fertilize an egg.
- Motility. To reach the target, males' sperm have to move. Riding the semen wave will only take the sperm so far. To reach the egg, sperm have to move on their own—wriggling and swimming the last few inches to reach and penetrate the egg. Sperm movement (motility) is an important characteristic of healthy sperm. Males were most likely to be fertile if at least half of sperm are moving.

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http://mayoclinic.com/health/fertility/mc00023, © 1998-2010 Mayo Foundation for Medical Education and Research. All rights reserved. Accessed on April 24th, 2010.

2. The Female

The female sex cells develop within paired organs in the abdomen called ovaries, which are the female gonads. Within each ovary of a newborn female are about a million immature ovum. Each individual ovum is surrounded by nourishing follicle cells, and each ovary houses ovum in different stages of development. After puberty, about once a month, one ovary releases the most mature ovum. Beating cilia sweep the mature ovum into the fingerlike projections of one of two fallopian tubes. The tube carries the ovum into a muscular, saclike organ called the uterus, or womb.

The period of ovulation or the release of eggs from the ovaries we need to know to determine the time/day a woman is fertile, because pregnancy is only possible if intercourse (coitus) was carried out around the time of ovulation. Ovulation occurs approximately 14 days before the menstrual period to come. In other words, between two successive menstruation, the ovaries will release the ovum, every time one of the right ovary and other times from the left ovary. 149

And how to know the period of ovulation:

- Biopsy of endometrium
- Basal body temperature
- Vaginal cytology
- Cervical Lymph
- Sap pH of the vagina, and
- Endoscopy.

Every month a woman let go of one or two eggs (ova) from the ovary, which was captured by the lobe (fimbriae) and into the Fallopian tubes. Then, the order of growth of ova (oogenesis) as below 150:

- oogonia
- primary oocyte

Rustam Mochtar, *Sinopsis...*, p. 16Rustam Mochtar, *Sinopsis...*, p.17

- primary ovarian follicle
- liquor folliculi
- first ripening ovum
- maturation of both sperm fertilize the ovum.

Oogonia of embryonic growth by age women, the number of oogonia is¹⁵¹:

> Newborns : 750,000

> 6-15 years old : 439 000

> 16-25 years old : 159 000

26-35 years old : 59 000

35-46 years old : 34 000

Menopause : none

3. Conception (Fertilization)

Conception is an event the union between sperm cells with egg cells in the fallopian tube.

Only one sperm that have undergone capacitating process that can cross the pellucid zone and into vitelus ova. After that, the pellucid zone changes so that ovum can not be passed by other sperm. This was followed by the integration pronucleus process called zygote, which consists of male and female reference Genetics. This process will produce:

XX-zygote (female);

XY-zygote (male).

Within a few hours after fertilization, zygote cleavage begins during three days until the morula stage. The result of this conception continues to move into the uterine cavity by the flow and vibration cillia and tuba contractions. Until blastula stage, the process of implantation in the uterine wall is begin. 152

Rustam Mochtar, Sinopsis..., p.17Rustam Mochtar, Sinopsis..., p.19

C. Phases of Human Development in Uterus

1. The Sperm (*Nuthfah*)

The sperms (*nuthfah*) are formed in the *testicles*,¹⁵³ which in turn are created, as proved by embryology, from cells underneath the kidneys at the back and then go d own to the lower abdomen at the last weeks of pregnancy. Man's fluid mainly contains the following components: the *sperms* which should be gushing, and motile to cause fertilization and *Prostaglandin* which causes contractions to the uterus, thus helping the transport of sperms into the place of fertilization.

While hundred millions of these sperms (500 m.- 600 m.) enter through the vagina to the uterine cervix, only one sperm is able to fertilize the ovum (Fig. 2.3.a.);¹⁵⁴ crossing through a long distance to reach the place of fertilization in the *Fallopian Tube* which connects the ovary with the uterus. After direct fertilization, a quick change occurs to the membrane of the ovum preventing the entrance of the rest of the sperms (Fig. 2.3.b).

The sperm contains 23 chromosomes, of which one chromosome determines the sex of the embryo. The chromosome in the sperm is either (Y) or (X), while the chromosome in the ovum is always (X). When a sperm of the chromosome type (Y) mingles with an ovum of the chromosome (X), the formed zygote will be male (XY), whereas the embryo will be female (XX) if the sperm (X) mingles with an (X) ovum. So, the sex of the embryo is determined by the sperm (the male), rather than the ovum (the female). 155

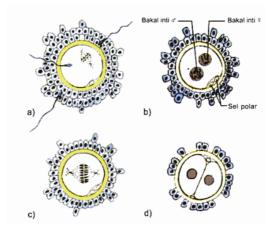
After 5 hours of forming the zygote (Fig. 2.3.c), which is the primary human cell containing 46 chromosomes, the dominant and recessive genetic characteristics can appear in the parent's sons or

155 Muhammad Izzuddin Taufiq, *Dalil Anfus Al-Quran dan Embriologi*, Solo: Tiga Serangkai, p. 50

¹⁵³ *Testicle*: the male sex and endocrine gland that produces sperm and male sex hormones, including the steroid testosterone, found in some types of animals. See, Daniel S. Wibowo, *Anatomi Tubuh Manusia* Cet. III, Jakarta: PT. Gramedia, p. 116

¹⁵⁴ Johannes W. Rohen, *Embriologi* ..., p. 19

grandsons (the stage of genetic programming). The zygote is then divided quickly (Fig. 2.3.d) without a change in size and move from the Fallopian Tube (connecting the ovary and the uterus) towards the uterus, where it is implanted as seeds are implanted in the soil. 156



(Fig. 2.3) (a) hundreds of sperms, only one can fertilize the ovum. Penetration of spermatozoa to ovum (impregnation), and rigidity membrane of ovum and pellucid zone (blocking polyspermatozoa), (b) Formation of male and female core, DNA replication and mixing between both cores; (c) First division phases; (d) The zygote divides within hours of the process of fertilization.

The process of fertilization and the travel of the zygote to the uterus continue for about 6 days, and the zygote keeps implanting (known as blastocyst) and growing in the uterus wall for 15 days, when the 'alaqah (thick clotted blood) stage begins.

2. *Al-'Alaqah* (Leech-like clot)

The stage of 'alaqah starts on the 6th day and ends on the 14th day, after which the embryo is gradually developed and looks like a leech, which lives in ponds. This is stages of implantation. *Alaqah* hangs to the lining of the uterus by the umbilical cord. Blood is then formed in the vessels at the shape of closed islands, and is not circulated in blood vessels, thus having the image of clotted blood.¹⁵⁷

Although it is in the nature of human body to expel any external matter, the uterus does not reject the 'alaqah implanted in its

¹⁵⁶ Johannes W. Rohen, *Embriologi* ..., p. 20.

¹⁵⁷ Johannes W. Rohen, *Embriologi* ..., p. 21

lining despite the fact that half of the 'alaqah components and genes are from an external source (the father).

3. *Al-Mudghah* (chewed-like lump of flesh)

The embryo is transformed from the stage of 'alaqah to the beginning of the stage of mudghah on the 24th day to the 25th day, which is a very brief period if compared with the period of the nuthfah changing to 'alaqah. This stage starts with the appearance of somites on the 24th or 25th day on top of the embryonic scapula, and then gradually appears at the embryo's bottom. On the 28th day the embryo is formed of several bulges, with grooves in between, thus giving the embryo the image of a chewed gum. The embryo turns and rolls in the cavity of the uterus during this stage which ends by the end of the 6th week. 1558

It is significant that the stage of *mudghah* starts with the growth and increase of cells in a large number. The *mudghah* looks like a piece of meat which has no distinguished structure, then after a few days, the second stage starts, called the stage of formation, where some organs begin to appear, such as the eyes, tongue and the lips, but human distinguishing features do not appear except at the end of the 8th week. Hands and legs also appear in this stage.

4. The Stage of bones

During the 6th week, the cartilaginous skeleton starts to spread in the body. Yet, we do not see the human image features except at the beginning of the 7th week, where the shape of the embryo takes the look of the skeleton. Transformation from the *mudghah* form to the beginning of the skeleton form occurs in a very short period of time at the end of the 6th week and the beginning of the 7th week. This stage is

Dr. Sharif Kaf Al Ghazal, page: http://www.quranandscience.com/human/116-embryology-and-human-creation-between-quran-a-science-37.html, September 4th, 2009.

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Dr. Sharif Kaf Al Ghazal, page: http://www.quranandscience.com/human/116-embryology-and-human-creation-between-quran-a-science-37.html, September 4th, 2009.

characterized with the appearance of the skeleton which gives the embryo the human image. 160

The miracle of human creation in the holy Quran is one of many other medical miracles. Having reviewed previous detailed statements of Quranic verses and scientific analysis of the embryonic stages, it is evident that these Quranic verses give an accurate description of the main stages the embryo encounters during creation and formation until delivery. It is noticed that these changes coincide with the remarks of modern embryology, and truly expresses the external phenomena of changes that result from the internal changes. The Quranic descriptions contain expressions comprehensible to people of different backgrounds, whereas the current expressions in embryology used for the description of these stages do not identify the distinguished characteristics of the embryo in each stage, as numerical coding is used without reference to any description. This proves the wonderful miraculous nature of the Quran, which cannot be revealed except from the comprehensive knowledge of the Omniscient.

D. View of human genetics

1. Pattern of Heredity

Human heredity¹⁶¹ is the process by which particular traits or conditions are genetically transmitted from parents to children, causing resemblance of individuals related by descent. It involves the separation and recombination of genes during fertilization and the further interaction of developmental influences and genetic material during embryogenesis. In other words is the relocation of the biological properties that cause the similarity of the atomic generation to generation by a process of reproduction.

However, the development of this factor to the ancestral gene a new parent can be understood after the discovery of the mechanism of inheritance at the end of 19th century (1865-1869), precisely when

¹⁶⁰ Johannes W. Rohen, *Embriologi* ..., p. 37-39

¹⁶¹ Inheritance in genetic characteristics from parents to children.

Gregor Mendel managed to put a picture of the legal basis of genetics through a research and experiments on peas (beans). He concluded that the nature of the process of decline from one generation to the next generation influenced by factors that are very small, which was subsequently known as 'gene' (bearer of derivatives). 162

Later, Morgan (1866-1945) able to prove that the offspring characteristics on the organism were carried by very small particles threads, and were living in the cell nucleus. These particles have a high sensitivity to produce chromosomes and stain it, so he later termed *chromosome*. ¹⁶³

If we make correlation with the heredity of the human personality, the consequences are, if chromosome one of the male and female have the disorder (e.g. hemophilia, syndrome, albino, etc.) Then the child will also suffer the same disorder. Its like was described by Ricki Lewis:

Genes on the X chromosomes have different patterns of expression in females and males, because a female has two X chromosomes and a male just one. In females, X-linked traits are passed just like autosomal traits—that is, two copies are required for expression of a recessive allele, and one copy of a dominant allele. In males, however, a single copy of an X-linked allele causes expression of the traits of illness, because there is no copy of the gene on a second X chromosome to mask the other's effect. A man inherits an X-linked trait only from his mother, because he get his Y chromosome from his father. The female is considered homozygous for X-linked traits, because he has only one set of X-linked genes. 164

In the Prophet tradition also narrated by al-Bukhari and Muslim in their both sahih, from Abu Hurairah r.a.: 165

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¹⁶² Yusuf al-Haji Ahmad, Kemukjizatan ..., p. 60

¹⁶³ Yusuf al-Hajj Ahmad, *Kemukjizatan* ..., p. 61.

¹⁶⁴ Lewis, Human Genetics, p. 118

¹⁶⁵ Al-Bukhariy, *Sahih al-Bukhariy*, no. 7314; see also Ibn Jarir al-Asqalani, *Fathul Bari*, vol. 9, p. 366

قال فما ألوانها قال حمر قال هل فيها من أورق قال إن فيها لورقا قال فأنى ترى ذلك جاءها قال يا رسول الله عرق نزعها قال ولعل هذا عرق نزعه ولم يرخص له فى الإنتفاء منه)

The A'rabî came to Rasulullah (pbuh) said: "My wife was born a black boy and I was denied, then Rasulullah (pbuh) asked: Do you have a camel? (A'rabî) answered: Yes. Rasulullah asked: What color? (A'rabî) answered: red. Rasulullah asked: Is there some of grey? Then answered: actually there is grey.

This is a A'rabî what was born by his wife, a boy, black, not black in color and the color of his mother's income suspicion of his wife, went to the Prophet peace be upon him who asked him the color of an idiot, said: red collection red, he said, peace be upon him: Is the grey? Brown, or any color, the color was ash, a A'rabî replied that the paper and many collect grey; He said, peace be upon him: it is where? Abu boy perhaps a tendency to sweat any color was lured in one of the assets, an individual by the Prophet peace be upon him: This also contravenes the color does not indicate that the child of adultery might have a color in one of the assets.

2. Sex Chromosomes

The human body contains billions of cells. There are 46 chromosomes in each cell. These chromosomes follow a number and an arrangement pattern. There are 23 matching pairs. The last pair determines sex. Females have an XX chromosome and males have XY. The normal female karyotype is 46 XX and the male 46 XY. The sex with two different sex chromosomes is called the **heterogametic sex**, and the other, with two of the same sex chromosomes, is the **homogametic sex**. In human, this makes males heterogametic and females homogametic. Some

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¹⁶⁶ Ir. Suryo, Genetika Manusia, p. 186

other species are different. In birds and snakes for example, male are ZZ (homogametic) and females are ZW (heterogametic). 167

The cell can be divided and subdivided into several sections. A centromere divides the cell into two unequal halves. The number depicts its location on the arm of the chromosome. This arranged pattern is termed a karyotype. 168 Each of the chromosomes has features that distinguish it from another in size, location and the pattern of light and dark bands.

What goes on with the chromosomes during the reproductive process? Every individual inherits one chromosome in each pair from each of its parents. When conception takes place, there is fusion of the mother's egg cell and the father's sperm cell into a fertilized egg. The fertilized egg contains half of the genes from each parent. The gender of the baby is determined from the sex chromosome in the male. The baby will be a male if the sperm carries a Y chromosome and a female if it carries an X.

3. Sex Determination

Chromosomes are distinguished on the autosomes and sex chromosomes. Human body cell contains 46 chromosomes consisting of 44 autosomes and 2 sex chromosomes. In women, this sex chromosomes: two X-chromosomes, while in men the form of an X-chromosome and one Y-chromosome.

In normal people, chromosome formula for men and women can be written as follows. (According to International Genetics Congress in Paris, 1971):

- **❖** 46,XX (female)
- **❖** 46,XY (male)

The result of female or male are genetically when sperm carrying X-chromosomes fertilize the egg (carrying the X chromosome), there was a female and if sperm carrying the Y-chromosome which fertilize the egg, then there a male.

¹⁶⁷ Lewis, *Human* ..., p. 112 ¹⁶⁸ Ir. Suryo, *Genetika* ..., p.186

In relation with sex determination, researcher has found hadits narrated by Imam Ahmad:

... فأيهما علا كان الولد والشبه بإذن الله، إن علا ماء الرجل على ماء المرأة كان ذكرا بإذن الله، وإن علا ماء المرأة على ماء الرجل كان أنثى بإذن الله...

"... If one dominates the other, then the child will be as dominant, with the permission of Allah, if the male sperm is more dominant than female sperm, it will get the boys, with the permission of Allah. and if the female sperm are more dominant than the male sperm, it will get young girls, with the permission of Allah..." 169

This Hadits mentions physical methods to obtain the boy or girl, but does not nullify that result only from God.

In this research, author restricts the three variables that allow humans naturally to determine the baby's sex, the quality of food, the timing of intercourse, and the center acid and base. ¹⁷⁰

a. The Quality of Food (The Ionic Equilibrium)

Research has provided evidence (Rajan S. Joshi) that overweight women have an impact in the process of sex selection, this effect on sperm receptor associated with the egg wall. Potassium and

وفي مسند أحمد من حديث ابن عباس وفيه قول رسول الله صلى الله عليه وسلم للجماعة من اليهود حين جاؤوه: فأنشدكم بالله الذي لا إله إلا هو الذي أنزل التوراة على موسى هل تعلمون أن ماء الرجل أبيض غليظ وأن ماء المرأة أصفر رقيق، فأيهما علا كان الولد والشبه بإذن الله، إن علا ماء الرجل على ماء المرأة كان ذكرا بإذن الله، وإن علا ماء المرأة على ماء الرجل كان أنثى بإذن الله قالوا: نعم.

¹⁷⁰ Dr. Najeeb Layyous, page: http://www.layyous.com/root folder/sex selection.htm, accessed on April 25th, 2010.

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¹⁶⁹ What is asked about the Jews was mentioned in Musnad Ahmad. Such as:

sodium ions versus calcium and magnesium have important effects on these receptors, causing changes in the composition of the wall and that in turn affects the attractiveness of male sperm or female.¹⁷¹

In simple effects, from increasing the ratio of potassium ions and sodium in the diet and the low ratio of calcium and magnesium caused a change in the egg wall to attract male sperm (Y-sperm) and female sperm exceptions (X-sperm) and with so the result of fertilization will be male.

And vice versa, increasing the proportion of calcium and magnesium in the blood and low-sodium and potassium attract the sperm carrying female chromosomes (X-sperm) and the exclusion of sperm carrying male chromosomes (Y-sperm) and thus the result of fertilization will be female.

To follow this method, one woman had to diet for a period of not less than two months to support the food stock, which encourages the desired gender is attached table (Table 3.1) shows the nutritional food sources of calcium, magnesium, potassium and sodium.¹⁷² In this case at least for two months only:

Table 3.1

Nutrition Table for Female Diet

If you wa	ant a male	If you want a female		
Sodium	Potassium	Magnesium	Calcium	
Food containing salt.	 Corn flakes. Fresh fruit, mainly bananas, apricots, grapefruit, melons, nectarines, orange juice, pears, and cherries. Dried fruits. Fresh vegetables 	 Bran Bread and bran flakes. Almond, cashew, peanuts, and peanut butter without 	 Milk and dairy products (yogurt) block of cheese of all kinds. Bread made from white wheat without salt and yeast. Grains such as almonds, hazelnuts, 	

¹⁷¹ Rajan S. Joshi, page:

http://genselect.com/goodnews/PreConceptionalSexSelectionByIonicEquilibrium, accessed on April 26th, 2010.

http://www.layyous.com/root folder/sex selection.htm, accessed on April 25th, 2010.

		such as green beans, broccoli (flower), corn, peas, potatoes, sweet potatoes, tomato juice or fruits, whether or paste. Chicken without the skin, especially the chest, turkeys. Cereal. Legumes, especially lentils and white beans dried. Sugar. Jam, butter, and margarine. Rice. White bread. Meat and fish.	-	salt. Soy beans, potatoes in small quantities. Milk.	sunflower, sesame. Salmon, sardines and shellfish. Vegetables, especially paper, including lettuce, watercress, parsley, green coriander, mallow, okra, carrots, garlic. Chickpeas, Tahina. Butter without salt
• • •	Coffee Refrain from brown bread And allows two eggs in a week		 All kinds of fruit except bananas, oranges, cherries, apricots, and plums. Cooked tomatoes. Honey. Limited amounts of meat and fish was 125 g / day. To avoid from chocolates and sweets and spinach. 		

b. The Timing of Intercourse

Though the timing protocol has got not much of success rate, it has been combined with the diet method. This is based on the fact that Y sperms are lighter and they swim faster than the heavier X sperms. So if the intercourse happens immediately after the ovulation the probability of abundance of Y sperms is present. In contrast to this if the intercourse happens 24 hours or more before the ovulation there are chances of abundant X sperms.¹⁷³

 $\frac{http://www.genselect.com/goodnews/PreConceptionalSexSelectionByIonicEquilibrium,}{on~April~26^{th},~2010}.$

¹⁷³ Rajan S. Joshi, page:

Accordingly, it could set a date for ovulation to female to create a relative time for sexual intercourse to be the result of desired gender. For example, if sexual intercourse takes place immediately after ovulation occurs, the likely the result is male and vice versa.

It should be noted that this method alone does not boast a high chance of success, but if it were linked to appropriate diet, they improve their efficiency too, must also calculate the date of ovulation accurately as it varies from one woman to another in the same woman from month to month.

c. The Center Acid and Base.

These things become a modern general community as it is becoming accepted that the center acid is more suitable for female and the center base suitable for male sperm, and people thought that the types of food plays a role in this regard and that the results of metabolism of the food different and given circles acidic or base and this method did not achieve encouraging results. In contrast to the diet which alter the Prospective egg of the animal male or female, as stated before, is also widely believed that the shower vaginal acidic or alkaline can work from the middle of this method changed the chances of success are almost 5%, which can not be ignored, but it must be noted that these solvents are used must be prepared carefully and can be obtained from various pharmacies.¹⁷⁴

¹⁷⁴ http://www.layyous.com/root_folder/sex_selection.htm, accessed on April 25th, 2010.