

EXPLORING THE GENETIC IMPLICATIONS OF ENDOGAMOUS MARRIAGE IN THE QURAN AND SCIENCE

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Abstract

With the advancement of time and scientific knowledge in the medical field, endogamous marriage now encompasses activities that may result in offspring with abnormalities or genetic diseases. This controversial issue has prompted the author to explore the theme of endogamous marriage according to the Qur'an based on Q.S an-Nisa' [4]: 23 and Q.S al-Ahzab [33]: 50 while incorporating a scientific perspective. This article adopts a qualitative approach based on a literature review with primary sources al-Qur'an, then correlates the Koran and science. The findings indicate that according to the Qur'an, endogamous marriage is deemed lawful, appropriate, and safe. From a scientific standpoint, endogamous marriage does not invariably entail the risk of producing offspring with defects or genetic diseases, as such outcomes may occur only if one or both parents carry recessive genes. Therefore, regardless of the type of marriage, the paramount consideration is the health status of the bride and groom. As a solution, the article suggests implementing mandatory pre-marital health screenings, especially for endogamous marriages. This approach aims to facilitate informed decisions in establishing harmonious households and ensuring the birth of healthy offspring.

Keywords: Al-Qur'an, Endogami's marriage, Science

Abstrak

Seiring isu-isu keagamaan dan sains medis, pernikahan endogami termasuk kegiatan yang berpotensi menghasilkan keturunan yang memiliki kelainan ataupun mewarisi penyakit genetik. Polemik ini mendorong penulis untuk mengangkat tema pernikahan endogami menurut al-Qur'an berdasarkan Q.S an-Nisa' [4]: 23 dan Q.S al-Ahzab [33]: 50 dengan perspektif Saintifik. Penelitian ini menggunakan penelitian kualitatif berbasis kajian Pustaka dengan sumber primer al-Qur'an, kemudian mengkorelasikan antara al-Qur'an dan sains. Hasil penelitian menunjukkan bahwa pernikahan endogami menurut perspektif al-Qur'an adalah sah dilaksanakan, benar, dan aman.

Kemudian dalam perspektif Sains pernikahan endogami tidak selalu beresiko melahirkan keturunan yang mengalami kecacatan, kelainan, ataupun penyakit genetik, karena hal tersebut dapat terjadi hanya kedua orang tuanya atau satu diantaranya membawa gen resesif. Sehingga apapun jenis pernikahannya yang terpenting adalah kondisi calon mempelainya harus sehat. Sehingga muncullah solusi untuk melaksanakan pemeriksaan kesehatan pra-nikah, diwajibkan pada pernikahan endogami. Hal ini bertujuan agar dapat mengambil keputusan yang lebih bijak dalam membangun rumah tangga yang harmonis serta memperoleh keturunan yang sehat dan baik.

Kata kunci: Al-Qur'an, Pernikahan Endogami, Sains

INTRODUCTION

Marriage in Islam is considered a form of worship. The contract of marriage in Islam is allowed and strongly encouraged for Muslims. It can be viewed as an act of worship when the essential pillars and conditions are fulfilled, while avoiding actions prohibited within marriage. (Nurhadi, 2015, p. 245). Moreover, the Qur'an distinguishes between lawful and prohibited marriages. In Q.S an-Nisa' [4]: 23 described several women who were forbidden to marry, among them because of blood relations (nasab) or close relatives. According to Law No. 1 of 1974 concerning Marriage Article 8 it is said that it is forbidden to marry his brother because of blood relations, both vertically and horizontally connected. (Supriatna et al., 2008, pp. 139–140). Between two people; 1) Blood related in a straight down or upward lineage, 2) Sideways lineage, that is, between brothers, between one and

one's parents' siblings and between people and their grandparents' siblings. (*Undang-Undang Nomor 1 Tahun 1974 Tentang Perkawinan, Pasal 8*, n.d., p. 96).

In addition, according to the Compilation of Islamic Law (IPR) in Chapter IV on the Prohibition of Marriage Article 39 stated, marriage is prohibited between a man and a woman due to sexual relations; a) with the person who gave birth or who passed him or her offspring, b) with a woman of paternal or maternal descent, c) with a sister woman who gave birth. (*Kompilasi Hukum Islam (HKI), Pasal 16*, n.d., p. 16).

QS. an-Nisa' [4]: 23, the above Law, and IPR prohibit the marriage of close blood relatives (nasab). Cousins (children of uncles/aunts either paternal or mother-line) are also known as close relatives, but in verse Q.S an-Nisa' [4]: 23, cousins are not among those who are haram to marry because they are not mentioned in the verse. It is further

explained in Q.S al-Ahzab [33]: 50, that marrying a cousin is permissible in Islam even if it belongs to a close relative. This cousin marriage is called endogamous marriage in this study.

An endogamous marriage is a marriage between ethnicities, clans, tribes, or kinships within the same environment. Another understanding expressed by Goode is that endogamous marriage is a form that prevails in society that only allows members of its society to marry other members of their own group. (J William Goode, 2007, p. 134).

One of the purposes of marriage is to produce offspring. Getting good and healthy offspring is a blessing given by God and as a complement to the home that is built. Good and healthy offspring is formed from a combination of DNA or genetics carried by both parents. So that in addition to external factors, internal factors, namely DNA or genetics, are the main factors in forming these offspring. Thus, the scientific perspective of endogamous marriage can be a factor in producing children who have deficiencies both in disability, abnormalities, and genetic diseases. The science that studies the nature that a person brings to his descendants who will be passed on again to his children and grandchildren is

called heredity. (Muhammad Jusuf, 2008, pp. 2, 5).

Research related to Endogamous marriage has been done before. There are many perspectives and views on Endogamous marriage, but as explained in the Literature Review sub-title, of the many studies that have been used as references, there is no research that specifically looks at endogamous marriage through the perspective of the Qur'an as the main source of Muslims and juxtaposed with science or science about endogamy that develops over time.

LITERATURE REVIEW

Several studies on Endogamous marriage have been conducted. However, some studies are still through the Qur'anic approach alone or in terms of law. Such as the study of endogamous marriages of Arab descent from the perspective of Islamic law (Afif & Yustafad, 2022) and the study of endogamous marriage: perspectives on customary law and Islamic law (Nenni Rachman, 2016). Then in terms of the impact of marriage itself, there are studies that examine its impact on family harmony (Hidayatulloh & Sabtiani, 2022), as well as its impact that can

cause congenital abnormalities (Diah Ayu Nur Rochmawati, 2016).

On the other side of Hadith aspect, There is research on endogamous marriage in the perspective of the hadith of the Prophet Muhammad (a scientific review) (Abdul Malik Lahmuddin, 2017), and the closest is a writing by A. Darussalam entitled "Endogamous marriage from the perspective of Islam and Science" (A. Darussalam, 2017), It's just that this study does not focus on Qur'anic verses alone in the sense that it also uses hadith, besides that in the study the analysis of scientific perspectives is still not seen clearly and in detail.

RESEARCH METHODS

This article is a qualitative research based on literature data. The main sources for this article include the Qur'an and its interpretations of endogamous marriage, as well as various books of tafsir. While secondary sources consisting of scientific and medical books, journals, articles, and other relevant literature, complete the analysis. The analytical method used in this article is the descriptive-analytical method. This research correlates between the Qur'an and science in order to get results that

can be a solution for endogamous marriage when viewed from two perspectives (Qur'an and science).

RESULTS AND DISCUSSION

Endogamous Marriage

Endogamy encompasses a broad scope, and its interpretation can vary depending on the perspective of the environment or each individual entity involved. For instance, when influenced by the cultural norms of the surrounding community, it's referred to as cultural endogamy. Similarly, when dictated by the caste system within a community, it's termed caste endogamy. So does in the context of marriage, the term "endogamous marriage" refers to unions within a specific social or familial group. In this article, endogamous marriages pertain to the marriage of close relatives or cousins. According to Goode, endogamous marriage is a form that prevails in society that only allows members of its society to marry other members of their own group. (J William Goode, 2007, p. 134). Endogamous marriages persist in Indonesia without a doubt.

In the Qur'an, the author examines endogamous marriage, specifically focusing on cousin marriage. Marrying a

cousin is not considered prohibited within the mahram relationships as per described in Q.S an-Nisa' [4]: 23 and in Q.S al-Ahzab [33]: 50 it is said that it is permissible to marry a cousin.

In QS. Al-Ahzab [33]: 50, a sentence that reads *وَبَنَاتِ عَمِّكَ وَبَنَاتِ خَالَكِ وَبَنَاتِ أُخْتِ خَالَتِكَ الَّتِي هَاجَرْنَ مَعَكَ* which means... (similarly) the daughters of your father's brother, the daughters of your father's sister, the daughters of your mother's brother, the daughters of your mother's sister who migrated with you..., according to Sayyid Quth in the book *Tafsir fi Zhilalil Qurán* This verse is included in the lawfulness for the Holy Prophetsa in marrying the group mentioned in the verse. Among them were marrying the daughters of his paternal uncle, the daughters of his paternal aunt, the daughters of his maternal uncle, the daughters of his maternal aunt. (Sayyid Quthb, 2004, pp. 199–200).

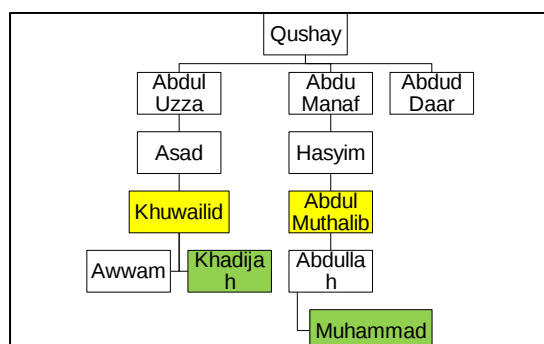


Figure 1. Marriage tree of the Holy Prophetsa married Siti Khadija

According to Hamka in tafsir al-Azhar it is lawful for the Prophet to marry the daughters of uncles of fathers, daughters of aunts of fathers, daughters of uncles of mothers, and daughters of aunts of mothers. As the marriage of the Holy Prophetsa and his family who carried out the cousin marriage. The first marriage of the Prophet with Siti Khadija was the marriage of a cousin of the nephew, this was due to the Prophet Saw's grandfather, Abdul Muttalib with Siti Khadija's father, Khuwailid who was a cousin. And Siti Khadija with Muhammad's father Abdullah was a cousin. (Hamka, 1983).

The marriage of Muhammad with Zainab bint Jahasy who had been divorced by Zayd the adopted son of the Prophet Saw. Zainab was the son of Umamah bint Abdul Muttalib. So the Holy Prophetsa with Zainab bint Jahasy was a cousin. The marriage between Ali bin Abi Talib and Fatimah bint Muhammad Saw. Ali bin Abi Talib was the cousin of the Prophet and Fatimah was the daughter of the Prophet Saw. So the marriage of Ali bin Abi Talib and Fatimah bint Muhammad Saw was a cousin of nieces and nephews. (Quraish Shihab, 2011).

The marriage of Ruqayyah bint Muhammad Saw and um Kulthum bint Muhammad Saw before marrying the companion of the Prophet of Allah, Uthman bin Affan, Ruqayyah married Utbah bin Abu Lahab and um Kulthum married Utaibah bin Abu Lahab then divorced after descending verse 1 of Q.S al-Lahab, which means: "Perish both hands of Abu Lahab and verily he will also perish". Utbah and Utaibah were cousins of the Prophet (peace be upon him), so the marriage of Ruqayyah and um Kutsum was previously the marriage of a nephew's cousin. The marriage of Ali bin Abi Talib with Umamah bint Abu Ash bin Rabi' son of Zainab bint Muhammad Saw, who was the sister of Ali bin Abi Talib's first wife, Fatimah bint Muhammad Saw, then the marriage of Ali bin Abi Talib with Umamah bint was a cousin of grandchildren. (Quraish Shihab, 2011, p. 296).

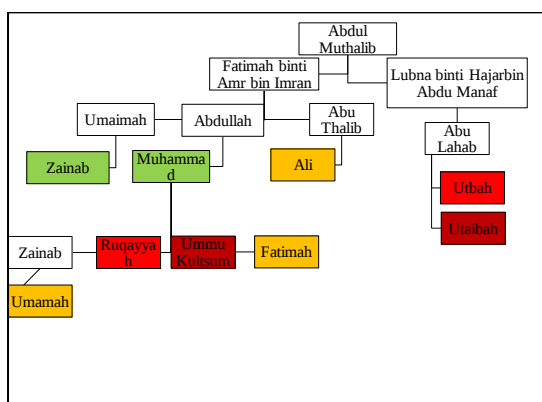


Figure 2. Family tree of the Holy Prophetsa performing endogamous marriages

From the history of the marriage of the Holy Prophetsa and his family described in the tables above shows that marriage between cousins was carried out by the Prophet and the family of the Prophet as a form of maintaining his descendants (tribe) and strengthening Islam.

Then Q.S al-Ahzab [33]: 50 according to Hamka does not only apply to the Holy Prophetsa, because this verse is a completion of the explanation of Q.S an-Nisa' [4]: 23 about women who can and cannot be married. (Hamka, 1983, p. 69). So that marriage between cousins can also be carried out by Muslims in the time of the Holy Prophetsa until now. It should be underlined that endogamous marriages carried out by the Holy Prophetsa and his family were more distant-cousin marriages, not close cousins or cousins at all.

Analysis of Endogamous Marriage Verses

There are 2 verses on endogamous marriage namely Q.S an-Nisa' [4]: 23 and Q.S al-Ah}zab [33]: 50 and both belong to the category of suras *Madaniyah*. An-Nisa' verse 23 explains about women who are haram among them in this discussion are close relatives or blood relatives (nasab), namely; mother, daughter sister

sister father sister mother daughter of sister (niece) daughter of brother (niece). (Khoerudin, 2017, p. 29) So that if you carry out a marriage, it is not valid because it is included in the marriage requirements that the prospective husband or wife is not the mahram. So that the marriage does not perfectly fulfill the pillars and conditions of marriage.

QS. an-Nisa>' [4]: 23 descended in connection with Zaid ibn Harithah the adopted son of the Holy Prophet(saw) with Zaynab bint Jahsh. When the Holy Prophetsa married the ex-wife of his adopted son, Zayd, after a divorce. It is conveyed by Ibn Juraij that Juraij asked Atha about the verse that reads "*Wa halā ilu.. sampai ..min ashlābikum.*", then Atha replied, "I once talked about the verse that the Prophet Muhammad (peace be upon him) married the former wife of Zaid bin Harithah." Then, the polytheists commented on it. And so came the verse "*Wa halā ilu.. until..min ashlābikum.*" And also came verses 4 and 40 of Surah al-Ahzab. (HR. Ibn Jarir). (Imam Jalaludin as-Suyuthi, 2016)

Q.S al-Ah}zab [33]: 50 reasons for the descent of the verse that reads *innā*

ahlalnā... until...*ma'ak* because when the Prophet wanted to marry um Hani bint Abu Talib, which means the Prophet wanted to marry the son of the uncle of the Prophet Saw. So that the relationship between the Prophet and um Hani was cousins. Then um Hani refused and the Holy Prophetsa accepted the reason for the refusal. (Imam Jalaludin as-Suyuthi, 2016, p. 197). After that, the verse came down and confirmed that the Prophet Muhammad was forbidden to marry um Hani because um Hani did not join the Prophet (saw) to migrate to Medina.

As the hadith narrated by Tirmizi, as follows:

عَنْ أُمِّ هَانِيٍّ بِنْتِ أَبِي طَالِبٍ، قَالَتْ: خَطَبَنِي رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ فَأَعْتَذَرْتُ إِلَيْهِ فَعَدَّرَنِي، ثُمَّ أَنْزَلَ اللَّهُ تَعَالَى: (إِنَّا أَخْلَلْنَا لَكَ أَزْوَاجَكَ اللَّاتِي أَتَيْتَ أَجُورَهُنَّ...) قَالَتْ: فَلَمْ أَكُنْ أَحِلًّا لَهُ لِأَنِّي لَمْ أَهَاجِرْ، كُنْتُ مِنَ الطَّلَاقِ.¹

Hānī bint Abī Thālib said, "The Messenger of Allah SWT. once proposed to me, (but I took it because I felt unworthy of him). I explained to him why I rejected him so he could accept my reasoning. God ta'ālā then derived the verse, innā ahlalnā laka azwājakal-lāti ātaita ujūrahunna... I am not lawful for him because I did not migrate (i.e., with him to Medina). I was just a liberated

¹ According to Tirmidhi this hadith is Hasan, while according to al-Hakim this hadith is shahih.

woman (i.e.: she converted to Islam at the Conquest of Mecca and received liberation from the Messenger of Allah)." (Muchlis M. Hanafi, 2017, pp. 360-361)

The Prophet's non-lawfulness to marry um Hani was not due to the "brotherhood" of cousins, but the prohibition in the hadith was "specialized" because of the migration of Muslims from Mecca to Medina. As in tafsir an-Nu>r it is explained that it has been lawful for you the daughters of your uncle and the daughters of your aunt, either from the side of the father or mother who also migrated with you. For those who do not migrate with you, it is not lawful for you. (Teungku M. Hasb ash-Shiddieqy, n.d., p. 3295). So from some of the explanations above, it shows that it is not a prohibition against marrying cousins, but rather emphasizes that migrating has virtues. (Muhammad ibn 'Ali Ibn Muhammad ibn Abdullah as-Shaukani al-Yamin, n.d., p. 335)

As for the hadith that discusses endogamous marriage will produce weak offspring:

لا تنكحوا القرابة القريبة ، فإن الولد يخلق ضاويًا

Means: "*Do not marry a close relative, for his son will be weakly created.*" (Zurifah Nurdin, 2020, p. 165).

This hadith is quoted from the book Subulus Salam by Muhammad ibn Ismail as San'ani, narrated by Imam Ahmad. However, this hadith is known as a false hadith. In the book al-Badrul Munir volume 7 by Ibn Mulqim that Al-Hafidz Abu Amr bin Sholah said the hadith has no basis for reference. Explained further by Shaykh al-Bani r.a said the hadith has no basis that makes it marfu' (up to the Prophet (peace be upon him)). (Syekh Muhammad Shalih al-Munajjid, n.d.). It was later agreed upon by Al-Iraqi in *Takhrij al-Ihya* Volume 2 and Ibn Hajar in *Talkhis Habir* Volume 3 finds no reliable origin and according to Ibn Qutaibah categorizes the hadith into unknown hadiths. (Muslimah.or.id, 2014). So that the hadith cannot be a basis for avoiding endogamous marriage, because of its history the Holy Prophetsa and the family of the Holy Prophetsa carried out endogamous marriages.

Ayat an-Nisa' [4]: 23 and al-Ahzab [33]: 50 have texts that contradict haram and lawful, but the context in which it is directly forbidden is to marry blood (nasab), excluding cousins. While the text of al-Ahzab [33]:50 clearly justifies close relatives i.e. cousins. Thus the relationship between Q.S an-Nisa' [4]: 23 and Q.S al-Ahzab [33]: 50 is equally

explaining that endogamous marriage can be performed in the Qur'an.

A Science Analysis of Endogamous Marriage

Science has many branches, among which is the science of genetics. The science of genetics arose from Gregor Johann Mendel's experiments on crossing ercis bean plants (*Pisum satifum*) announced in 1966. (Elya Nusantara, 2014, p. 3). Genetics is a branch of biology concerned with the inheritance of traits (heredity) and variations that are passed down from generation to generation. (Elya Nusantara, 2014, p. 1). The science of genetics explains the similarities and differences in traits that will be passed on and passed on by parents to their offspring. (Yunus Effendi, 2020, p. 2).

The human body has millions or even billions of cells that have their respective roles, namely both in nature, health, advantages, and disadvantages of a person determined by the cells in his body. DNA (Deoxyribonucleic acid) is a macromolecule in the form of very long threads formed from a large number of *deoxyribonucleotides*, each of which is composed of one base, one sugar and one phosphate group. (Dadan Rosana, n.d., p. 3). DNA is an important structure

in the body that becomes the brain that can regulate all processes in the body. Therefore, DNA has the main task as an inheritor of traits by carrying genetic material from one generation to the next with DNA acting as a gene maker and genes making chromosomes.

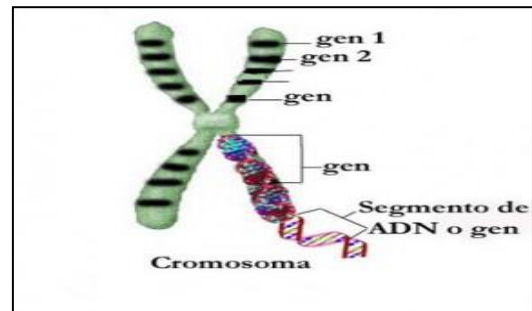


Figure 3. Deoxyribonucleic acid (DNA)(Amelia, 2012)

A gene according to Morgan is a compact particle and occupies a locus on the chromosome that contains units of genetic information and regulates certain inherited traits. (Dadan Rosana, n.d., p. 4).



Figure 4. Gene(Rizal Fadli, 2021)

Then chromosomes are smooth objects of straight shape such as rods or bent and substances that easily bind dyes inside the nucleus. (Dadan Rosana, n.d., p. 3).



Figure 5. Chromosome(Komal Bhatia, n.d.)

Marriage unites two people between a man and a woman not only as a "union between the two" but also the desire for offspring. Dr. Farah Asyuri Yasmin, said:

"The process of pregnancy is caused by the egg has been fertilized by sperm. Each egg and sperm carries certain traits that will later be passed on to the child, either through his mother, father or a combination of the two". (Hafidhoh Nuurul Ismatullah, 2018, p. 41).

Both parents will carry their own DNA. The difference in DNA carried by the two will produce good offspring because the DNA produced will be formed and developed, so that it will produce quality offspring. While endogamous marriages, such as: blood and family will carry DNA that has similarities. The DNA equation carried by both allows DNA to be less formed and less developed because the DNA carried produces recessive genes. (Yunus Effendi, 2020, p. 37).

According to Prof. Dr. Sultana MH Faradz, PhD, a Professor of medical genetics at Diponegoro University, Faculty of Medicine said that: *"Close sibling marriages have a biological impact on children. If the parents have the same recessive gene, then the The child will have abnormalities or disabilities. But if only one of the two masters, either father or mother, has a recessive gene, then it is very likely that the child born dominant or not defective".* (Hafidhoh Nuurul Ismatullah, 2018, pp. 40–41).

Thalassemia is a genetic disease of blood disorders due to lack or decrease in hemoglobin production/formation. Molecularly, thalassemia is distinguished from alpha thalassemia (α) and beta (β), while clinically it is distinguished from thalassemia minor and major. (Kusumawardani, 2015, p. 139). Thalassemia is an autosomal disease that arises due to being inherited by his parents, either from the father or mother contained in the genetics carried. Thalassemia is a genetic disease caused by not forming, not developing or experiencing impaired synthesis of globin chains - α or synthesis of globin chains - β which are the constituent components of hemoglobin. So that the production of

hemoglobin or red blood is not formed properly because red blood cells always rupture. So that the patient suffers from a lack of red blood cells. Therefore, thalassemia sufferers have signs of paleness, dizziness, faster heart rate, and so on. (Lantip Rujito, 2019).

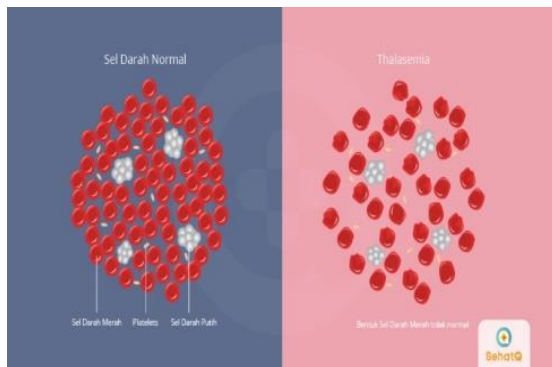


Figure 6. The left image represents normal blood cells, the right image is a blood cell of thalassemia sufferers. (Eko Widiyanto, 2020)

Thalassemia is found in the Mediterranean, Middle East, South Asia, Peninsular China, Southeast Asia, and the Pacific Islands. Indonesia is one of the countries that has thalassemia sufferers $\beta +$ with an average overall frequency of 3-10%. Thalassemia sufferers in Indonesia are in Medan at 4.07%, Yogyakarta at 6%, Banyumas at 8%, Ambon at 6.5%, Jakarta at 7%, Ujung Pandang at 8%, Banjarmasin at 3%, Maumere and Bangka at 6% and some areas have a prevalence of up to 10% which means that from 100 Indonesians 3 to 8 people suffer from thalassemia $\beta +$

or thalassemia minor. (Lantip Rujito, 2019, p. 2).

Thalassemia not only affects public health but also affects the country's economy. Thalassemia occupies the 5th position of the largest disease in Indonesia. If the state does not participate in handling cases of thalassemia sufferers, thalassemia will continue to grow rapidly. So the state must prevent and treat thalassemia sufferers who require a lot of funds. It is calculated that the funds that need to be spent only for blood transfusions of thalassemia patients range from 100 thousand rupiah to 1 million rupiah per month. (Lantip Rujito, 2019, p. 4). Thalassemia patients are divided into three based on clinical classification, as follows:

First, Thalassemia major. Thalassemia major is a severe level of sufferer. Thalassemia major sufferers have symptoms of pale skin throughout the body, weakness, and no appetite. Therefore, thalassemia major patients are required to do blood transfusions for life about once every 2 to 4 weeks. (Mikhael Yosia, 2020).

Patients with thalassemia major will be seen from the age of infants 3 to 18 months by showing symptoms of

thalassemia major. (Siti Rohimah & Fitriani Puspasari, 2020, p. 31). If not treated immediately, it will cause some complications. Complications of the disease that arise become the cause of death of patients are getting bigger. Complications of the disease cause of death of patients with thalassemia major is heart problems by 70%. The risk of having a child with thalassemia major is; The baby can die while still in the womb, bone defects in the face, easily tired, lethargic, and short of breath, skin other than pale can be yellow, do not have a good appetite, enlarged lymph and dark urine. (Jian Bagas Wara S & Alfu Zukhrufu Firdausu, n.d., pp. 2–3). Here is a picture of a child with thalassemia major:



Figure 7. Face shape of thalassemia major sufferers (*Judul* (Orthodontics) , n.d.).

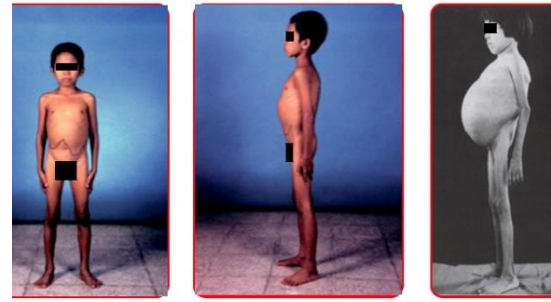


Figure 8. Thalassemia sufferers with enlarged liver and spleen (Asep Abdul Hamid, 2020).



Figure 9. Thalassemia major patients who must undergoing treatment at a young age (Febri, n.d.).

Treatment for thalassemia major patients has not been found so that until now thalassemia major sufferers cannot be cured. (Siti Rohimah & Fitriani Puspasari, 2020, p. 31). Things that can be done now to prolong the life of thalassemia major sufferers are with blood transfusions and bone marrow surgery. (Regar, 2009, p. 157).

Blood transfusions are done every 2 to 4 weeks at regular intervals to help replace dead red blood cells. (Siti

Rohimah & Fitriani Puspasari, 2020, p. 32). If blood transfusion is not done then the survival of thalassemia major sufferers will be short. Thalassemia major patients who do not get blood transfusions only have an age of no more than three decades. (Siti Rohimah & Fitriani Puspasari, 2020, p. 31). Because normal red blood cells are produced by the bone marrow and red blood cells aged 120 days will then be damaged while patients with thalassemia major red blood cells are damaged before up to 120 days or half of normal blood cells or less than 30 days. (Siti Rohimah & Fitriani Puspasari, 2020, p. 31) (Jian Bagas Wara S & Alfu Zukhrufu Firdausu, n.d., p. 4).

Although blood transfusion as a means of life support for thalassemia major sufferers, blood transfusion for thalassemia major sufferers has an impact. Blood transfusion can have an impact on iron buildup in the body such as in the herpa, spleen, skin, heart, and others. So that it interferes with health in the organs of the body. (Regar, 2009, p. 157). To be able to reduce the impact is also carried out treatment and therapy of iron collation. (Jian Bagas Wara S & Alfu Zukhrufu Firdausu, n.d., p. 4). Iron collation therapy is called *Iron chelating agent* (removing iron from body tissues),

giving iron chelation (*desferoxamine*) overcome excess iron, folic acid, vitamin E 200-400 / day, and vitamin C 100-250 grams / day. (Regar, 2009, p. 157).

Bone marrow transplantation is not easy to do because finding a bone marrow that matches the patient is certainly difficult, because usually for bone marrow transplantation must have a match and the match is owned by his family or relatives. While the occurrence of thalassemia major due to genetics carried by his family. So it is difficult to do a bone marrow transplant and also the success rate if the operation is still done only around 30% of cases. (Regar, 2009, p. 157).

The life journey of thalassemia major sufferers with treatment now improves the quality of life of sufferers. As quoted from Coverage 6 of Cipto Mangunkusumo Hospital data that every year the quality of life of thalassemia major sufferers increases. In 1980 only until the age of 20, in 1990 only until before the general age of 27 years, 2010 until the age of 32 years, and in 2018 it has reached the age of 56 years. (Benedikta Desideria, n.d.).

Although there are ways of treatment for thalassemia major sufferers, the better action is to stay

away from it and prevent the increase in thalassemia major sufferers. Prevention can be done in 2 ways, namely with primary prevention and secondary prevention; Primary prevention, namely by providing knowledge and understanding of thalassemia and its causes and effects in general and more specifically for couples who want to marry. Secondary prevention, namely by examining couples who want to have offspring. So that pregnancy can prevent the birth of babies with thalassemia. (Regar, 2009, p. 158).

Second, Thalassemia intermedia. Characterized by clinical symptoms as well as severity that exist between major and minor classifications. These people are genetically heterogeneous. Usually people with this strangeness are quite healthy and only need a deep blood transfusion when inflammation appears. (Paramdana, 2023, p. 3259).

Third, Thalassemia minor. Thalassemia minor is a type of thalassemia in which a person has a thalassemia gene defect, but does not show signs of thalassemia or signs of being carriers of the trait. Thalassemia will be seen after the patient enters the initial *gajala*, such as weakness,

dizziness, and pain in the abdomen. (Amelia et al., 2018, p. 16).

The clinical classification above is known that patients with thalassemia major are the most severe. However, what is important to avoid is thalassemia minor sufferers or carriers of the trait. Described in Mendel's writings about monohybrid crosses studied in the subjects of natural sciences (IPA) commonly found about crosses between round seeds and long seeds, white rats with black rats and so on. Thalassemia crosses can also be explained so as to see the possibility that the offspring will bring which clinical classification of thalassemia.

If a normal person marries a person with minor thalassemia, then the normal is denoted (NN) and the minor thalassemia is denoted (Nn), as follows:

Crosses : Thalassemia minor x Thalassemia minor		
Genotype : Nn x Nn		
Punnet Box:		
	N	n
N	NN (Normal)	Nn (Thalassemia minor)
n	Nn (Thalassemia minor)	nn (Thalassemia Major)

A normal person married with minor thalassemia produces 50% of normal

offspring and 50% of minor thalassemia out of 100%, or 2:2 out of 4 chances of offspring. (Persi.or.id, 2018)

If someone with minor thalassemia gets married, the minor thalassemia is denoted (Nn), as follows:

Crosses : Thalassemia minor x Thalassemia minor		
Genotype : Nn x Nn		
Punnet Box:		
	N	n
N	NN (Normal)	Nn (Thalassemia minor)
n	Nn (Thalassemia minor)	nn (Thalassemia Major)

Fellow minor thalassemia sufferers produce 25% normal offspring, 50% minor thalassemia, and 25% major thalassemia out of 100%, or 1:2:1 out of 4 chances of offspring. (Ganie, 2008, p. 6).

If a normal person marries a person with major thalassemia, the normal person is denoted by (NN) and the person with major thalassemia is denoted by (nn), as follows:

Crosses : Normal x Thalassemia Major		
Genotype : NN x nn		
Punnet Box:		
	n	n
N	Nn (Thalassemia minor)	Nn (Thalassemia minor)
N	Nn (Thalassemia minor)	Nn (Thalassemia minor)

A normal person marrying a major thalassemia sufferer will produce 100% minor thalassemia offspring. (Rokom, 2023). To explain further, see the following image of the thalassemia reduction scheme:



Figure 10. The scheme of decreasing thalassemia that the offspring will suffer. (Talasemia Di Tengah Pandemi Covid-19, n.d.).

From the explanation of the crossing theory above, it can be concluded that problems in the offspring will arise caused by the recessive gene. However, if it is normal, then the offspring produced will certainly be normal and there will be no problems as explained by Dr. Sultana previously about the recessive genes. So the middle way is to find out what kind of individual or couple which carries a recessive or normal gene is by carrying out a health examination. So endogamous marriage is not a problem that will produce offspring with defects, disorders or genetic diseases.

CONCLUSION

Based on the explanation described earlier, the author can conclude that endogamous marriage according to the perspective of the Qur'an is valid, true, and safe as described in verses Q.S an-Nisa>' [4]: 23 and Q.S al-Ah}zab [33]: 50. Then in the perspective of science endogamous marriage is not always at risk of giving birth to offspring who have defects, abnormalities, or genetic diseases, because it can occur if both parents or one of them carries a recessive gene. The word "if" is certainly uncertain meaning that it can exist or not exist, so whatever the type of marriage, the most important thing is the health condition of the bride and groom.

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