

GENETICS OF DISEASES, ETHICS AND BEAUTY IN SELECTION OF MATES (AN ISLAMIC PERSPECTIVE)

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SUMMARY: In Islam, the family that represents the nucleus of society is established on a healthy basis in all aspects including the health and genetics. Ethical and genetic understanding of diseases and beauty in selection of mates are discussed in this paper in the light of The Glorious Qur'an and in Hadith, the Honorable Sayings of the Prophet of Islam, Mohammad (PBUH). Modern genetic understanding corresponds to Islamic instructions depicted from the Glorious Texts and demonstrates the antecedence of this religion and its texts revealed by Allah, The Creator. This strengthens faith and opens horizons for revealing further links between science and Glorious authentic texts in Qur'an and Hadith.

Is one who worships devoutly during the hour of the night prostrating himself or standing (in adoration), who takes heed of the Hereafter, and who places his hope in the Mercy of his Lord - (like one who does not)? Say: "Are those equal, those who know and those who do not know? It is those who are endued with understanding that receive admonition (The Glorious Qur'an, 39:9).

Key words: The Glorious Qur'an, Honorable Hadith (Mohammad's Sayings), Ijaz (Scientific Miracles in The Glorious Qur'an and Hadith), Genetics, Genetic Diseases, Marriage.

INTRODUCTION

Genetics from Ancient Greek γενετικός *genetikos*, "genitive" and that from γενεσις *genesis*, "origin"(1) Genetics a discipline of biology, is the science of genes, heredity, variation in living organisms as well as the principles and mechanics of heredity and transmission of

traits through generations (2). Genetics with its modern formula is a modern science established by Gregor Mendel (1822-1884) who is the Father of this science. In 1909 the word *gene* was coined by Wilhelm Johannsen, thus giving genetics its name. However, some "genetic" notions can be found in the human traditions since ancient times. Some of these are based on objective and others are based on subjective basis. However, the

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authentic Islamic Glorious Texts prove to match well with the modern genetics.

It is He Who hath sent His Messenger with guidance and the Religion of Truth, to proclaim it over all religion, even though the Pagans may detest (it) (The Glorious Qur'an, 9:33).

As an introductory example on genetics in Islam, the Prophet of Islam, Mohammad (PBUH) mentioned the variable traits between people and the transmission of these traits through generations (e.g. pre and post-Islamic epochs):

Abu Hurairah (May Allah be pleased with him) reported: It was asked, "O Messenger of Allah! Who is the most honourable amongst mankind?" He (PBUH) said, "The most honourable of them is one who is the most pious of them." They said, "We are not asking about this". He said, "Then, the most honourable of men was Yusuf (Joseph), the Prophet of Allah, the son of Allah's Prophet, who was the son of the Prophet of Allah, who was the son of the Khalil of Allah (i.e., Ibrahim (PBUH))' They said, "We are not asking you about this." He enquired, "Are you then asking me about the classes of the Arabs? The best of them in the Pre-Islamic Period of Ignorance are the best of them in Islam, provided they comprehend the religious knowledge" (3).

The diversity of traits is evoked in The Glorious Qur'an for plants as well:

Seest thou not that Allah sends down rain from the sky? With it We then bring out produce of various colours. And in the mountains are tracts white and red, of various shades of colour, and black intense in hue (The Glorious Qur'an, 35:27).

Interestingly, The Glorious Qur'an evoked the phenomenon of diversity among people and among animals followed by a confirmation that those truly fear Allah, among His Servants, who have knowledge.

And so amongst men and crawling creatures and cattle, are they of various colours. Those truly fear Allah, among His Servants, who have knowledge: for Allah is Exalted in Might, Oft-Forgiving (The Glorious Qur'an, 35:28).

Interesting links are demonstrated and discussed throughout this manuscript, which focuses on ethical

and genetic understanding of diseases and beauty in selection of mates.

The family is of utmost importance in Islam and its establishment on a healthy basis is a priority. While choosing the future mate, health, physical, moral and psychological aspects should be taken into consideration.

Prophet Mohammad (PBUH) advised Muslims to marry and beget and considers that an essential part of the Muslim's life and religious duties:

"Nikah (marriage) is my Sunna. He who shuns my Sunna is not of me." (4).

"Marry the child-bearing, loving woman for I shall outnumber the people by you on the Day of Resurrection" (5).

Narrated by Abdullah Ibn Abbas, the Prophet said "Your wives in Paradise are the loving and childbearing ones" (6).

Narrated by Ibn Masoud, the Prophet said "O young men, whoever among you can afford to get married, let him do so, for it is more effective in lowering the gaze and protecting chastity. Whoever cannot afford that should fast, for it will be a shield for him." (7).

In the Hadiths, careful selection of the mates is reported as a religious order:

"Choose well your mates (for your semen), marry with equal, suitable and fitting individuals" (8-10).

Narrated by Aisha, the Prophet said "Choose well for your semen (your wife), marry only with equal, suitable and fitting individuals" (11).

Prophet Mohammad (PBUH) was, however, aware of the transmission genetics and advised his followers to choose appropriate and healthy mates at all levels including beauty as will be detailed in the next sections.

Methodology

The modern knowledge and literature notably in the domains of health and genetics are screened in the Glorious Texts of Qur'an and in Honorable Hadith (Sayings of the Prophet of Islam, Mohammad (PBUH)). The links are demonstrated and discussed with the appropriate literature. Nothing of the screened texts were neglected

even the few ones that appeared contradictory with others. Very few examples of Hadiths qualified to be weakly attributable to the Prophet were discussed. In this context, this kind of Hadith is not necessarily false but its authenticity is not absolute. It can be considered if supported by other more authentic text(s) and/or experimental evidences. Weak Hadiths can be cited with conditions well compiled and reviewed from the classical Islamic scholars (12).

Ethical and Genetic Understanding of Diseases

Prophet Mohammad (PBUH) instructs Muslims to care for sick people and to pay them visits. The Prophets considers that as a duty of Muslim to be respected:

Narrated By Abu Huraira, The Prophet said "Every Muslim has five rights over another Muslim (i.e., he has to perform five duties for another Muslim): to return the greetings, to visit the sick, to accompany funeral processions, to accept an invitation, to respond to the sneezer (i.e., to say: Yarhamuk-Allah which means may Allah bestow His Mercy on you when the sneezer praises Allah" (13).

Diseases and traits in general are related directly and indirectly to genetics and environment. Genetic disorders are typically broken down into three types: Chromosomal, monogenic and multigenic. Bitterly, over 7,000 human genetic disorders have been identified and catalogued, with up to five new disorders being discovered every year (14). Most disorders are, however, quite rare and affect one person in every several thousands or even millions. Over 4000 human diseases are estimated to be caused by single gene defects (monogenic). Monogenic diseases are classified into dominant and recessive. Dominant diseases are less misleading than the recessive ones simply because just one dominant allele is enough for its corresponding trait to appear. It is not masked as a recessive allele. Dominant diseases are however less common. Most of the other simple Mendelian-inherited genetic diseases, are however recessively inherited. In recessive inheritance, a sick individual must have inherited a defective allele from each of his/her parents. A comprehensive list of genetic disorders and if known, causal type of mutation and the

chromosome involved is available (15). The late acting disorders like Huntington disease are included. Such diseases are manifested once the sick individual has dramatically transmitted the defective genes to his progeny (15).

Islamic instructions attempt to minimize the genetic diseases in full respect and complete care of sick people once such diseases become a reality! By avoiding or minimizing such diseases, the society is healthier, prosperous and more productive. A collective duty is to take all the social, medical and research measures to cure or at least to live in full dignity with diseases and disorders.

The Prophet (PBUH) advised Muslims to choose mates with care, and justified that by the transmission of traits from generation to generation, with an indication that some traits are hidden (recessive inheritance). This indication is understandable from the Arabic word (دسّاس):

"Choose well your mates (for your semen) because characters are maskable (can be masked)" (16-18).

Nevertheless, it is believed that this Hadith (the Sayings of the Prophet) is assembled from two Hadiths:

"Choose well your mates because characters are maskable (can be masked), choose well for your semen and marry with rivals", "Choose well whom is going to beget your children because characters are maskable". (8).

The same meaning is also understood from another Sayings of the Prophet:

"Look with care for your child-bearing woman, characters are maskable (can be masked)" (19).

"Diminish your debts, you will be free. Diminish your sins and offenses, death will be easier. Look carefully for your child-bearing woman because characters can be masked (maskable)" (20).

The meaning of the expression of the Prophet (العرق دسّاس) is that characters and morals or tempers of parents are transmitted to children as reported in the prestigious Arabic dictionary Al-Monjed (21).

The Prophet instructs to avoid procreating sick and malformed individuals. A man or a woman can be divorced if the mate is afflicted with inherited mental retardation. Mental retardation is a serious health and

society problem possessing multiple backgrounds. Mental retardation is attributable to any condition that impairs development of the brain before birth, during birth or in the childhood years (22). In a Saying attributable to the Prophet (PBUH), he prohibits breast-feeding from a mentally retarded woman. This Saying is, however, qualified as weak or even very weak! (see Methodology). The mentioned prohibition can also entail prohibiting from choosing with mentally retarded mates (female mates at least as they are expected to breast-feed their children).

"The Prophet (PBUH) prohibits breast-feeding from a mentally retarded woman" (23, 24).

"Protect your children from the milk of a prostitute and a mad woman because milk transits (influences characters)" (25, 26).

As many as 50 percent of people with mental retardation have been found to possess more than one causal factor (27). Over 350 inborn errors of metabolism have been identified, most of which lead to mental retardation (22). Some research has determined that in 75 percent of children with mild mental retardation, the cause is unknown (28). There are, however, a number of genetic causes of mental retardation. Most identifiable causes of severe mental retardation (defined as an IQ of 50 or less) originate from genetic disorders. Up to 60 percent of severe mental retardation can be attributed to genetic causes making them the most common cause in cases of severe mental retardation (29). Fragile X syndrome (a single-gene disorder), a common genetic cause of mental retardation, is caused by the presence of a single non-working gene (called the FMR-1 gene) on a child's X chromosome. Fragile X syndrome is considered as one of the most common genetically transmitted forms of mental retardation. Furthermore, mental retardation can be late acting (e.g. the dominantly inherited Huntington disease manifesting mental retardation between 35 and 50 years) (30,31). By following the religious instructions of avoiding breast-feeding from mentally retarded women and consequently avoiding mating with mentally retarded people, the frequency of this genetically inherited disease can be decreased in the society.

Yet, the possibility of being born with mental retardation or developing the condition later in life can be caused or triggered by multiple environmental factors. These environmental factors can range from nutritional deficiencies to poverty and socioeconomic level, access to health care, cultural deprivation, personal health habits, exposure to pollutants and chemicals and drug use (32). Such miserable situations leading to disorders can be avoided by the Islamic instructions depicted from the Glorious Qur'an and Hadith. The Glorious Qur'an instructs the human being has a stewardship responsibility (Khilafa) on Earth:

And when your Lord said to the angels, I am going to place in the earth a khalif, ... (The Glorious Qur'an, 2:30).

Each of us is a "guardian" and responsible for his or her own subjects (wards):

Narrated 'Abdullah bin 'Umar: The Prophet said, "Everyone of you is a guardian and everyone of you is responsible (for his wards). A ruler is a guardian and is responsible (for his subjects); a man is a guardian of his family and responsible (for them); a wife is a guardian of her husband's house and she is responsible (for it), a slave is a guardian of his master's property and is responsible (for that). Beware! All of you are guardians and are responsible (for your wards)." (33).

Genetic Predisposition for Diseases and Infection

The prohibition of marrying the mental retarded individuals is discussed above. An important issue concerns extrapolation of prohibition of marrying with people possessing other diseases or genetic predisposition. A matter to be profoundly studied by medical and religion scholars. It is now known that the genetic predisposition is a prerequisite to acquire diseases in general. Genetic predisposition is an important factor for many serious health problems with considerable burden on the whole society like cardiovascular diseases (34), cancer, cystic fibrosis, Duchenne muscular dystrophy and hemophilia. The 17q-linked BRCA1 gene, for instance influences susceptibility to breast and ovarian cancer (35). The genetic predisposition was even demonstrated even in contracting bacterial diseases such as Crohn's disease

which is a chronic inflammatory disorder of the gastrointestinal tract. Crohn's disease is thought to result from the effect of environmental factors in a genetically predisposed host. A gene location in the pericentromeric region of chromosome 16, IBD1, which contributes to susceptibility to Crohn's disease, has been established through multiple linkage studies, but the specific gene(s) has/have not been identified. These results implicate NOD2 in susceptibility to Crohn's disease, and suggest a link between an innate immune response to bacterial components and development of disease (36).

In addition, Prophet Mohammad (PBUH) has significant insightful recommendations concerning diseases in general even if not directly genetically inherited. He (PBUH) instructs to fully avoid dangerous diseases and puts the basis for the quarantine some 1400 years ago!

Narrated By Abu Huraira: Allah's Apostle said, '(There is) no 'Adwa (no contagious disease is conveyed without Allah's permission) nor is there any bad omen (from birds), nor is there any Hamah, nor is there any bad omen in the month of Safar, and one should run away from the leper as one runs away from a lion.'" (37).

Narrated Osama Bin Zayd: Allah's Apostle said, "If you hear that it (plague) has broken out in a land, do not go to it; but if it breaks out in a land where you are present, do not go out escaping from it" (38).

Narrated Aisha, Allah's Apostle said "My nation will never be eliminated except by battles and plague. Some Muslims wondered what plague is, he said a kind of glands the camel's. Whoever stays where it breaks out is considered as Shaheed (Witness or martyr). Whoever escapes is considered as the one who escapes from the battle (fugitive)" (39).

Narrated Aisha, Allah's Apostle said Whoever escapes from the land of break out of plague is considered as the fugitive from the battle, "and whoever stays in such a land is considered as the one who persists in the battle land" (40).

Narrated Jaber Ibn Abdullah, Allah's Apostle said, "Whoever escapes from the land of break out of plague is considered as the fugitive from the battle and whoever stays in such a land is considered as the one who persists in the battle land" (41).

Narrated Aisha, Allah's Apostle said "My nation will never be severely touched except by battles and plague. Some Muslims wondered what plague is, he said a kind of glands the camel's...(42).

Sterility of the Exclusively Deformed Individuals

God, the Almighty and Full Merciful rendered infertile the exclusively disfigured offspring. In this way, the disfigurement genes are not transmitted and the afflicted individuals are the end of the road for such genes, fortunately:

Narrated Om Salama, Abdullah Ibn Omar and Ibn Masoud, Allah's Apostle said "Whenever Allah makes deformities, they are sterile" (25).

For example, the deformation resulting from abnormalities in chromosomal number due to abnormalities in chromosome 21 (Down syndrome), chromosome 13 and chromosome 18 disturbs considerably the meiotic division responsible for producing gametes. Furthermore, such deformations are debilitating and cause mental retardation and social isolation. For these reasons, their genomes are not transmitted, fortunately! (30, 31).

Beauty Considerations in Selection of Mates

The Prophet advised Muslims to consider beauty in their choice. This choice must be solid and the partner must be satisfactory at all levels including the beauty one. Looking to the would-be-spouse is not only permissible but it is an order (in the presence of one close relative to the future spouse (Mahram). However, looking should be with a critical rather than a desire-full eye! Knowing each other within a respectful Islamic environment increases the possibility of building a successful intimate and fruitful marriage.

Narrated Jaber, Allah's Apostle said "When a Muslim intends to marry a woman and has the ability to look at her, he should" (43, 44).

"When a Muslim intends to marry a woman, he can look at her, if his intention is just for marriage even if she does not know" (45).

Narrated Mogheira Ibn Sho'ba, Allah's Apostle said "Go and look at her, because that is more likely to create love between you" (46).

In fact, seeing within the Islamic circumstances evoked above entails talking. Seeing and talking can reveal many moral, religious, personal, psychological and physical, aspects and characters that a partner seek in each other. The personal, psychological and physical characters have an important genetic component. Careful seeing and talking help avoid many negative characters in the partner as well as in the progeny to come!

An example of the physical characters to be considered is "eyes". The Prophet indicated that the characters of eyes are to be taken into consideration while choosing the partner. He advised a companion to look well at the eyes of a possible future wife belonging to "Ansar", the Muslims of Medina (who hosted the emigrant Muslims coming from Mecca). It seems that the reason was for beauty defect (e.g. small eyes) or for a deformity or a disease in the eyes of "Ansar".

Narrated Abu Horaira, Allah's Apostle said "Go and have a look at her because the Ansar often have something (e.g. a defect) in their eyes" (47).

Consequently, in marriages, Muslims are instructed not to mask the defects (mental disorders, skin diseases...):

Omar said "If a man is deceived in his a marriage (e.g. with a leprous or a mental retarded women), an appropriate part of the dower is hers and the man should be compensated for that part of the dower by the person responsible for the deceiving and concealing information regarding that marriage" (48).

Narrated Said Ibn Al-Mosayyab, Omar said "If a man is deceived in his a marriage (e.g. with a leprous or a mental retarded women), an appropriate part of the dower is hers and the man should be compensated for that part of the dower by the person responsible for the deceiving and concealing information regarding that marriage" (49).

Most physical traits are g complex traits (multigenic) (50). For example there is considerable polygenic effect on height (51). Adult height has a heritability of between 76 and 90% (52) Some of the facial characteristics are Mendelian monogenetic as Chin dimple or Y-shaped fissure of chin (53), facial dimples (54), hairy ears or helix of pinnae (55), earlobe attachment (56), widow's peak or

pointed frontal hairline (57) and freckles (58).

Interestingly, the Prophet gave a family example of transmission of characters through generations when Hassan, his daughter's son was described to be the best resembling to him:

Anas said "The best to resemble the Prophet (PBUH) is Al-Hassan Ibn Ali" (59, 60).

However, priorities should be given to moral considerations (e.g. faith, good conduct...) rather than physical ones (e.g. beauty...).

Narrated by Abu Hurairah, may Allah be pleased with him, Allah's Apostle said:

A woman may be married for four things (reasons): for her property, her status (familial rank or nobility), her beauty and her religion; so try to get one who is religious (you should marry the religious woman), may your hand be besmeared with dust (may you enjoy welfare). In other words, you would be a loser if you do not choose the religious woman (61).

Narrated by Abu Hurairah, may Allah be pleased with him, Allah's Apostle said:"If a suitor approaches whose religion and character please you, then let him marry. Otherwise, there will be a lot of immorality and corruption in the world." (62).

"Do not marry women off for their comeliness; their comeliness may lead them to perdition. Do not marry them off for their possessions; their possessions may lead them to domineer. Marry them for their religion. A black, believing slave is better than a beautiful free women who does not believe." (63).

Islamic Values of Humanity in the Family

The Basis for the selection of both men and women should be the religious and character considerations, which are more valorized than economic (properties), family (rank) and even beauty considerations:

Narrated by Abu Hurairah, may Allah be pleased with him, Allah's Apostle said:"If a suitor approaches whose religion and character please you, then let him marry. Otherwise, there will be a lot of immorality and corruption in the world." (64-66).

Narrated by Abu Hurairah, may Allah be pleased with him, Allah's Apostle said:

A woman may be married for four things (reasons): for her property, her status (familial rank or nobility), her beauty and her religion; so try to get one who is religious (you should marry the religious woman), may your hand be besmeared with dust (may you enjoy welfare). In other words, you would be a loser if you do not choose the religious woman (61).

This is concordant with the Glorious Qur'an that confirms that women of purity are for men of purity, and men of purity are for women of purity:

Women impure are for men impure, and men impure for women impure and women of purity are for men of purity, and men of purity are for women of purity: these are not affected by what people say: for them there is forgiveness, and a provision honourable (The Glorious Qur'an, 26:6).

The value of women is safeguarded; it is similar to that of men. This is depicted from the following Hadith:

"Women are the twin halves of men" (67).

Both have responsibilities in life:

Divorced women shall wait concerning themselves for three monthly periods. Nor is it lawful for them to hide what Allah Hath created in their wombs, if they have faith in Allah and the Last Day. And their husbands have the better right to take them back in that period, if they wish for reconciliation. And women shall have rights similar to the rights against them, according to what is equitable; but men have a degree (of advantage) over them. And Allah is Exalted in Power, Wise (The Glorious Qur'an, 2:228).

However, the Prophet (PBUH) recommends strongly to take care of women.

"I advise you to take care of the women, for they are created from a rib and the most crooked portion of the rib is its upper part; if you try to straighten it, it will break, and if you leave it, it will remain crooked, so I urge you to take care of women" (68).

Interestingly, Prophet Mohammad (PBUH) recommends taking care of woman twice in the same Hadith. Actually, one of the last recommendations of the Prophet (PBUH) before he passed away was to take care of women!

One of the practical instructions of the Prophet (PBUH) concerns safeguarding of the family when a man feels attracted by a woman. He should return back to his wife and she will satisfy him!

Narrated by Jaber Ibn Abdallah, may Allah be pleased with him, Allah's Apostle said "A woman advances in the form of a devil and retires in the form of the devil. When one of you is charmed by a woman and she affects your heart, he should go to his wife and have intercourse with her, for that will repel what he is feeling" (69).

Conclusions and Perspectives

In this paper, inquiry has been made to explore links between the Glorious Texts and recently discovered facts in the domain of ethical and genetic understanding of diseases as well as beauty in selection of mates. Diseases and physical characters are to be taken into consideration while choosing mates. The faith and morality are, however, of great importance. More links can be looked for in genetics and the science of biology as a whole. This is a collective responsibility that strengthens faith and can provide an overwhelming evidence of the authenticity of Islam for Muslims and non-Muslims.

Then, by the Lord of heaven and earth, this is the very Truth, as much as the fact that ye can speak intelligently to each other (The Glorious Qur'an, 51:23).

Islam instructs us to inquire about the creation and consider that as worshipping of Allah.

Behold! in the creation of the heavens and the earth, and the alternation of night and day,- there are indeed Signs for men of understanding * Men who celebrate the praises of Allah, standing, sitting, and lying down on their sides, and contemplate the (wonders of) creation in the heavens and the earth, (With the thought): "Our Lord! not for naught Hast Thou created (all) this! Glory to Thee! Give us salvation from the penalty of the Fire * "Our Lord! any whom Thou dost admit to the Fire, Truly Thou coverest with shame, and never will wrong-doers Find any helpers! (The Glorious Qur'an, 3:190-192).

Prohibition of marrying with mental retarded people

could be depicted from the Hadiths in this paper. Extrapolation (of prohibiting marriages) for other specific dangerously inherited (or genetically predisposed) diseases needs a careful jurisprudence and cooperation between medical and religion specialists to make correct jurisprudence decisions (Fatwa). This might concern cardiovascular diseases, cancer, cystic fibrosis, Duchenne muscular dystrophy, hemophilia....

REFERENCES

1. Anonymous (*Online Etymology Dictionary*)
2. Glanze W. (Ed.). *The signet Mosby medical encyclopedia (revised edition)*. New York: Penguin Books Ltd. 1996.
3. Albokhary, Abu Abdullah. *Sahih Al-Bukhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 3353)*. <http://www.dorar.net/enc/hadith>
4. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 237/3)*.
5. Al-Sakhawy, Mohammad Ib Abdul-Rahman. *Al-Makased Al-Hassana Fi Katheer Min Al-Ahadeeth Al-Montashira Ala Al-Alsina (Ibn Hayyan)*. Revision by Mohammad Othman Al-Khisht. *Dar Al-Kutob Al-Araby. 2nd edition 1414 H. (No. 198)* <http://www.dorar.net/enc/hadith>.
6. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar el-Fikr, 1998 (Hadith no 453/1)*.
7. Al-Nawawy Al-Dimashqy, Abu Zakariyya. *Sahih Muslim. Dar-El-Fikr, 1995 (No 1400)*.
8. Al-Albany, Mohammad Nasser Al-Din. *Sahih Sunan Ibn Maja. Maktab Al-Tarbiya Al-Araby Li-Diwal Al-Khalij Al-Araby. 1st Edition. 1407 H (No. 1615)*. <http://www.dorar.net/enc/hadith>
9. Al-Bayhaqi, Ahmad Ibn Al-Hussein. *Al-Sunan Al-Kobra. Dar El-Kutub Al-Elmiyya. Revision by Mohammad Ata, Beirut, Lebanon. 1st edition 1994 (133/7)*.
10. Al-Thahaby, Mohammad Ibn Ahmad Ibn Othman. *Al-Mohathab Fi-Ikhtisar Al-Sunan Al-Kobra lil-Bayhaqy. Revision by Yasser Ibraheem Mohammad. Dar el-Watan Lil-Nasher. 1st edition, 1422 H*.
11. Al-Jerjany, Abdullah Ibn Odayy. *Al-Kamel Fi-Do'afa' Al-Rijal. Revision by Sheikh Adel Abdel-Mawjoud and Sheikh Ali Mo'awwad. Dar El-Kotob El-Elmiyya, Beirut, Lebanon, 1997* <http://www.dorar.net/enc/hadith>.
12. <http://www.binatiih.com/go/forum.php?action=view&id=2081>.
13. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 1240)*

ACKNOWLEDGMENTS

All thanks are addressed ultimately to God (Allah) who guides us in this life. Many thanks are addressed to my colleagues and family for their support during this work.

Praise be to Allah, Who hath sent to His Servant the Book, and hath allowed therein no Crookedness (The Glorious Qur'an, 18:1).

<http://www.dorar.net/enc/hadith>.

14. McKusick VA. *Mendelian Inheritance in Man. Catalogs of Human Genes and Genetic Disorders. (Eleventh edition)*. Baltimore: Johns Hopkins University Press. 1994.
15. http://en.wikipedia.org/wiki/List_of_genetic_disorders.
16. Ibn Maja, Abu Abdullah Ibn Yazeed Al-Rebey Al-Qizweeny. *Sunan Ibn Maja. Dar El-Kutob El-Elmiyya (No 1970)*.
17. Al-Sabaky (The son) Abdel-Wahab Ibn Ali. *Tabakat El-Shafi'iyya El-Kobra. Revision by Dr. Mahmoud al-Tanahy and Dr. Abdel-Fattah el-Helloo. Hajar lil-Teba'a Wal-Nasher, Egypt, 2nd edition 1992 (310/6)*.
18. Al-Daylami, Abu Shoja' Al-hamathany. *Mosnad Al-Firdaws Bi-Ma'thour El-Khetab. Revision by Said Ibn Basyouny Zaghoul. Dar El-Kutob el-Elmiyya. 1st edition 1986*.
19. Al-Absheehy, Shehab el-Deen Ahmad. *Al-Mostatraf Min Kil Fannen Mostathraf. Al-Mojamma' Al-Thakafy, 1999 (Chapter 2 page 218)*.
20. Al-Albany, Mohammad Nasser Al-Din. *Al-Selsela Al-Daeifa (shortened edition)*. Maktabat El-Ma'aref. Riyadh. (No. 2023) <http://www.dorar.net/enc/hadith>.
21. Al-Monjed, Dar-el-Mashriq, Beirut, 1986.
22. Scriver CR. *The metabolic and molecular bases of inherited disease. (Seventh edition)*. New York: McGraw-Hill. 1995.
23. Al-Haythamy, Abu El-Abbas. *Mojamma' Al-Zawaed Wa Manba' El-Fawaed. Dar El Kotob El-Elmiyya. 1st edition (265/4)* <http://www.dorar.net/enc/hadith>.
24. Al-Albany, Mohammad Nasser Al-Din. *Silsalat El-Ahadith A-Sahiha. Maktabat el-Ma'aref. 1st edition (No 5602)* <http://www.dorar.net/enc/hadith>.
25. Al-Albany, Mohammad Nasser Al-Din. *Sahih Al-Jame' Al-Saghir Wa Ziyadatoh. Al-Maktab El-Islamy. Beirut. 3rd Edition, 1408 H (No 5673)* <http://www.dorar.net/enc/hadith>.
26. Ibn Al-Qattan, Ali Ibn Mohammad. *Al-Wahm Wal-Iham El-Wake'ayn Fi Kitab El-Ahkam. Revision by Al-Hussein Ayat Said. Dar Tayba, Riyadh, 1st edition 1418 H (63/3)*.
27. AAMR. *Mental retardation: Definition, classification, and*

systems of supports, 9th edition. 1992.

28. Kozma C, Stock J. What is mental retardation. In Smith, R.S. *Children with Mental Retardation: A Parent's Guide*. Maryland: Woodbine House. 1992.

29. Moser HG. A role for gene therapy in mental retardation. *Mental Retardation and Developmental Disabilities Research Reviews: Gene Therapy*, 1, 4-6. 1995.

30. Campbell, Reece, Mitchell *Biology*, 8th edition. Addison-Wesley Longman Publisher. pp 366-373. 2008.

31. Griffiths A., William M., Miller Jeffrey H., Suzuki David T. et al., eds. *Genetics and the Organism: Introduction. An Introduction to Genetic Analysis (7th ed.)*. New York: W. H. Freeman. 1997.

32. Nelson-Anderson DL, Waters CV. *Genetic Connections; A Guide To Documenting Your Individual And Family Health History*, Sonters Publishing. 1995. <http://www.opengroup.com/open/dfbooks/096/0963915436.shtml>.

33. Albokhary, Abu Abdullah. *Sahih Al-Bukhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 5200)*. <http://www.dorar.net/enc/hadith>.

34. Agarwal DP. Genetic Predisposition to Cardiovascular Diseases. *International Journal of Human genetics: IJHG* 1(4): 233-241. 2001.

35. Miki Y, Swensen J, Shattuck-Eidens D, Futreal PA, Harshman K, Tavtigian S, Liu Q, Cochran C, Bennett LM, Ding W. A strong candidate for the breast and ovarian cancer susceptibility gene BRCA1. *Science*. 7; 266 (5182): 66-71. 1994. (7545954).

36. Ogura Y, Bonen DK, Inohara N, Nicolae DL, Chen FF, Ramos R, Britton H, Moran T, Karaliuskas R, Duerr R, H, Achkar JP, Brant SR., Bayless TM., Kirschner BS, Hanauer SB, Nuñez G, Cho JH. A frameshift mutation in NOD2 associated with susceptibility to Crohn's disease. *Nature*, 31; 411 (6837):603-6. 2001.

37. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 5707)*. <http://www.dorar.net/enc/hadith>.

38. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 5728)*. <http://www.dorar.net/enc/hadith>.

39. Al-Haythamy, Abu El-Abbas. *Mojamma' Al-Zawaed Wa Manba' El-Fawaed. Dar El Kotob el-Elmiyya. 1st edition (317/4)*. <http://www.dorar.net/enc/hadith>.

40. Ibn Hajar El-Asqalany. *Fath El-Bary Fi Sahif El-Bokhary. Revision by Moheb El-Deen El-Khateeb. Al-Maktaba Al-Salafiyya, 3rd edition 1407 H (198/10)*. <http://www.dorar.net/enc/hadith>.

41. Al-Albany, Mohammad Nasser Al-Din. *Sahih Al-Jame' Al-Saghir Wa Ziyadatoh. Al-Maktab El-Islamy. Beirut. 3rd edition, 1408 H (No 4276)*. <http://www.dorar.net/enc/hadith>.

42. Al-Albany, Mohammad Nasser Al-Din. *Irwa' El-Ghaleel Fi-Takhreej Manar El-Sabeel. Al-Matab el-Islamy, Beirut, 2nd edition, 1985 (No 72/6)*. <http://www.dorar.net/enc/hadith>.

43. Ibn Hanbal. *Al-Mosnad. Dar El-Fikr, 1994*.

44. Al-Shawkany, Mohammad Ibn Ali. *Nayl Al-Awtar Sharh Montaka Al-Akhbar. Dar El-Fikr, 2nd edition, 1403 H (239/6)*. <http://www.dorar.net/enc/hadith>.

45. Al-Haythamy, Abu El-Abbas. *Mojamma' Al-Zawaed Wa Manba' El-Fawaed. Dar El Kotob El-Elmiyya. 1st edition (279/4)*. <http://www.dorar.net/enc/hadith/>.

46. Al-Tirmithi, Abu Eissa Mohammad Al-Salmy. *Sunan El-Tirmithy (No 1087)*. <http://www.dorar.net/enc/hadith/>.

47. Al-Nesa'y, Ahmad Ibn Sho'ayb Abu Abdel-Rahman. *Sunan Al-Nissa'y Al-Kobra. Dar El-Kotob Al-Elmiyya, Beirut, 1st edition 1991 (3247)*. <http://www.dorar.net/enc/hadith>.

48. Al-Shawkany, Mohammad Ibn Ali Ibn Mohammad. *Al-Darary Al-Model'a Sharh Al-Dorar Al-Bahiyya. Dar El-Kotob El-Elmiyya. 1st edition, 1987 (212)*. <http://www.dorar.net/enc/hadith>.

49. Al-Albany, Mohammad Nasser Al-Din. *Irwa' el-Ghaleel Fi-Takhreej Manar El-Sabeel. Al-Matab El-Islamy., Beirut, 2nd edition, 1300 H (No. 1913)*. <http://www.dorar.net/enc/hadith>.

50. Glazier AM, Nadeau JH, Altman TJ. Finding genes that underlie complex traits, *Science* 298: 2345-2348. 2002.

51. J. Xu, E.R. Bleecker, H. Jongepier, T.D. Howard, G.H. Koppelman, D.S. Postma, D.A. Myers, Major recessive gene(s) with considerable residual polygenic effect regulating adult height: confirmation of genomewide scan results for chromosomes 6, 9 and 12, *Am. J. Hum. Genet.* 71: 646-650. 2002.

52. Palmert MR, Hirschhorn JN. Genetic approaches to stature, pubertal timing, and other complex traits, *Mol. Genet. Metab.* 80: 1-10. 2003.

53. <http://www.ncbi.nlm.nih.gov/omim/119000>

54. <http://www.ncbi.nlm.nih.gov/omim/126100>

55. <http://www.ncbi.nlm.nih.gov/omim/139500>

56. <http://www.ncbi.nlm.nih.gov/omim/128900>

57. <http://www.ncbi.nlm.nih.gov/omim/194000>

58. Zhang XJ, He PP, Liang YH, Yang S., Yuan WT, Xu SJ, Huang W. A gene for freckles maps to chromosome 4q32-q34, *J. Invest. Dermatol.* 122:286-290. 2004.

59. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (No 3752)*. <http://www.dorar.net/enc/hadith>.

60. Al-Albany, Mohammad Nasser Al-Din. *Sahih Sunan Al-Tirmithy. Maktab Al-Tarbiya Al-Araby Li-Diwal Al-Khalij Al-Araby. 1st Edition. 1407 H (No. 3776)*. <http://www.dorar.net/enc/hadith>.

61. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 995 (No 5090)*.

62. Al-Albany, Mohammad Nasser Al-Din. *Sahih Sunan Ibn Maja. Maktab Al-Tarbiya Al-Araby Li-Diwal Al-Khalij Al-Araby. 1st Edition. 1407 H (No. 1614).* <http://www.dorar.net/enc/hadith>.

63. Al-Albany, Mohammad Nasser Al-Din. *Al-Selsila Al-Daei'fa (Shortened). Maktabat El-Ma'aref. Riyadh (No 1060)* <http://www.dorar.net/enc/hadith>.

64. Al-Tirmithy, Abu Eissa Mohammad Al-Salmy. *Sunan El-Tirmithy (No 1084).* <http://www.dorar.net/enc/hadith/>

65. Ibn Maja, Abu Abdullah Al-Qizweeny. *Sunan Ibn Maja. Dar El-Kotob el-Elmiyya, 2002 (632/1 No 1967).*

66. Al-Naysaboury, Al-Hakem, Al-Mostadrak Ala Al-Saheehayn. Revision by Mokbel El-Wadeiy. *Dar El-haramayn 1st edition 1997.*

67. Al-Shawkany, Mohammad Ibn Ali Ibn Mohammad. *Min Fatawy Al-Imam Al-Shawkany. Revision by Mohammad Hallak. Maktabat El-Jeel Al-Jadeed, Sana'a, 1st edition, 1423 H (4775/10).* <http://www.dorar.net/enc/hadith/>

68. Albokhary, Abu Abdullah. *Sahih Al-Bokhary. An edition approved by Ibn-Baz. Dar El-Fikr, 1998 (Hadith no 3331)* <http://www.dorar.net/enc/hadith/>.

69. Al-Nawawy Al-Dimashqy, Abu Zakariyya. *Sahih Muslim. Dar-El-Fikr, 1995 (No 1403)* <http://www.dorar.net/enc/hadith/>.

INTERNET REFERENCES

* The Holy Koran translations of the meanings
Yusuf Ali Translation: http://www.harunyahya.com/Quran_translation/Quran_translation_index.php

University of Southern California Translation:
<http://www.usc.edu/schools/college/crcc/engagement/resources/texts/muslim/quran/>

* Hadith On-line reference: <http://www.dorar.net/enc/hadith>

*<http://www.usmle-forums.com/usmle-step-1-bits-pieces/1663-list-autosomal-dominant-diseases.html>;

*<http://posterous.pranab.in/list-of-autosomal-dominant-disorders-mnemonic>

*<http://www.binatih.com/go/forum.php?action=view&id=2081>

*<http://www.etymonline.com/index.php?search=Genetic&searchmode=none>

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