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HUMAN GENETIC ISSUES FROM SCIENTIFIC AND ISLAMIC PERSPECTIVES

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ABSTRACT

This paper aims at revealing the Human Genome Project (HGP) and human genetic issues arising from science and Islamic perspectives such as Darwin's evolutionary theory, human cloning and eugenics. Finally, issues arising from the applications of human genetic technology need to be addressed to the best possible way through ethics in science as well as through integration of Islamic teachings so that all achievements of this field do not spoil the nature and human populations. This in turn will make human life become better and more conducive from time to time.

Keywords: human genetics; Darwinism; human cloning; human genome project; eugenics.

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1. INTRODUCTION

Nowadays, studies on Human Genome Projects (HGP) are progressing worldwide involving genetic analysis to improve the level of human life quality. According to [1], HGP firstly aims to analyze the structure of human deoxyribonucleic acid (DNA) and secondly to identify the position of all human genes and thus contribute to biology especially in biological and neurobiological developments. In [2] stated that earlier studies of HGP had previously increased the level of understanding of the basic genetic defects and subsequently taking preventative measures and treating the defects. Historically, HGP began as early as 1985 pioneered by James D. Watson who was also the head of the United States National Institutes of Health (NIH) beginning 1988. In 1993, Francis Collins took over his place and since then NIH has changed to the National Human Genome Research Institute (NHGRI) due to some disagreements with the issue of patenting genes.

Generally, rough drafts related to genomes were completed in 2000 involving the cooperation of multinational geneticists from the United States, United Kingdom, France, Germany, Japan, China and India [1]. In [3] claimed that Craigh Venter and Francis Collins announced a complete draft of the human genome in 2001. In 2003, HGP completed its 98% genome which has been sequenced with 99.9% accuracy. Furthermore, human genome studies are very relevant to the bioinformatics field and are the two popular areas in modern biotechnology [4]. In fact, bioinformatics is an application of computer science and information technology involving the development of database and statistical methods for analyzing and identifying the relationship between biological data sets [5]. The use of this technology expedites the process of research and transmission of information which further enhances the efficiency of biological data storage.

After HGP was completed ten years ago, information mapping and sequencing of the whole human genes was then discovered by the researchers. Hence, present scientists are able to understand, identify and isolate the genes that have caused more than 4,000 genetic diseases and this commonly known as gene therapy [6]. Gene therapy involves the replacement of non-functioning genes and mutating with functioning genes using genetic engineering techniques in mammals particularly humans [7]. The main goal of this gene therapy is to prevent the occurrence of enzymes and proteins that are not necessary and may cause harmful

diseases. In addition, gene therapy can be divided into two types i.e. germ cell therapy and somatic gene therapy and involves two approaches namely in vivo and ex vivo. Therefore, recombinant DNA technology and genetic engineering are seen to be able to solve current problems involving the fields of medicine, agriculture, nutrition and environment and so forth. As such, the genetic field in today's modern biotechnology is highly emphasized by scientists around the world as it is capable of addressing genetic disease problems, thereby enhancing the quality of human life.

2. DARWIN'S THEORY OF EVOLUTION

Evolutionary theory was introduced in the 19th century by French biologist, Jean-Baptiste Lamarck in his work Zoological Philosphy in 1809 [8]. He emphasized that all living things have a vital force that evolves towards the formation of a better and complex organism and the traits get passed down to the next generation [9]. This Lamarck's theory was rejected by Mendel's law of genetic inheritance and the formation of a DNA structure that only transferred certain traits to the next generation. Next, the theory of evolution was introduced by Charles Darwin, a natural scientist who introduced Darwin's Theory of Evolution in 1859 through his work, The Origin of Species. He observed that the living organisms slowly evolved and were different from the previous organisms according to the needs of life known as natural selection [10-15]. Not only that, three main principles of Darwin's theory namely natural selection, sexual selection and inheritance of acquired characters. Nevertheless, this controversial theory had led to a large leap in genetic research during that time due to the non-solid genetic fundamentals that consequently was criticized and rejected by subsequent studies of Gregor Mendel, KarlsCorrens, Hugo de Vries, Erich Tschermak and William Bateson [16]. They claimed that the trait inheritance actually depends on genetic information in a gene within the chromosome through the gamete function known as Chromosomal Theory of Inheritance which has become the basis of genetics to this day. In addition, there are seven arguments that have rejected natural selection:

- Chance cannot generate complexity.
- The first step toward complex adaptation could not have been favoured.
- Natural selection creates nothing new.

- Natural selection violates the second low of thermodynamics.
- Human intellect could not have evolved by natural selection.
- Punctuated equilibrium implies that natural selection within species is ineffective.
- The human genome is too simple to account for such a complex organism.

Next, there are five evidences that have been found to support the theory of evolution [9]:

- The Fossil Record.
- Comparative Anatomy.
- Comparative Embryology.
- Vestigial & Atavistic Structures.
- Distributional Evidence.

These evidences however, have been rejected by the following arguments [17, 9]:

- No evoluationary continuity or connection to one another if species were created separately.
- Evolution cannot be observed and so cannot be proved.
- Evolutionary theory is not testable.
- There are no transitional forms.

There is much evidence of similarities between humans, chimpanzees as well as gorillas that is done through observing DNA comparisons, specifically between humans and chimpanzees [18]. Nevertheless, researchers are convinced that the equality of these three organisms is caused by ancestral factors and unlikely related to each other. Apparently, Darwin's Theory of Evolution has been criticized and debated by researcher particularly Islamic scholars through the works of [19-24]. Thomas Huxley defended Darwin's theory and claimed that he preferred to be a descendant of apes from humans. In [19] highlighted that there is a significant difference between monkeys and apes with humans in terms of general criteria such as functions and body shape. From [25, 20-21] point of view, the theory was initially convincing due to the fact that different vertebrate skeletons have significant equations and geological records also showed that there was a long period before the birth of humans.

These theories undoubtedly deny God's right in creating His beings because they are based solely on logical reasonings. Furthermore, in [8, 22-24] has reported that the embryological process has rejected evolutionary frauds. This can be seen in the case of Ernst Haeckel, a

biologist who supported the theory of evolution at the end of the 19th century. He presented a thesis titled Ontogeny Recapitulates Phylogery where he found out that the development of the embryo in women's womb began with the form of a fish, then transformed into a reptile and eventually human. The claims are unreliable simply because the gills existed are actually the inner ear and the parathyroid and thymus glands, while the tail part refers to the human spine. This Haeckel's falsifications were acknowledged by the two neo-Darwinism leaders i.e. George Gaylord Simpson and W. Beck. However, they completely rejected the theory in the 1920s and discarded such theory-related contents from the textbooks in the 1950s [24]. These statements are supported by the study of [26-27].

Non-Muslim scholars who hold fast and believe in this theory are convinced that this universe exists naturally and then gradually evolves toward perfection. To add, Darwin himself was doubtful about the existence of God and that had greatly influenced his thoughts and views of the universe [26]. Furthermore, other criticisms of this theory were also discussed by [27] from Islamic, scientific, philosophical and metaphysical perspectives. The evolution of the species to another species as proposed in Darwin's theory is very much contrary to Islamic views and is unlikely to happen because Allah the Almighty is the determinant of everything that happens in this world. Furthermore, scientific evidence on the validity of this theory cannot be proved by the two arguments i.e. the first organism is unlikely to be existing on its own naturally and the existence of evolutionary species will not occur physically and chemically. This is followed by philosophical and metaphysical views which indicate that this theory produces pseudo-philosophy without concrete arguments and it fails in giving scientific proof. Hence, this theory is seen as a great deal of doubts, shortcomings and weaknesses from the perspectives of Islam, science, philosophy and metaphysics. Undeniably, this may further damage the *aqeedah* (faith) of Muslims.

3. HUMAN GENOME PROJECT (HGP)

The Human Genome Project (HGP) is an initiative of the United States government through the Department of Energy (DOE) which has begun in 1990 to identify human genes (approximately 80,000-100,000) and its sequence (estimated 3 billion base pairs) in human chromosomes [4]. Meanwhile, in [31] believes that it started as early as in the 1970s and HGP

is important in the production of new drugs. The draft was completed in 2000 as a result of DOE and NIH (National Institutes of Health) cooperation and was expected to take 15 years to complete [1]. The initial goal of this project was to map all human genes, to build the physical map of human genome in detail and to identify all nucleotide sequences of 24 human chromosomes by 2005 [12]. Additionally, the project also analyzes genetic variations between humans, builds an organizational model through sequencing and mapping, develops new lab technologies, disseminates new genomic information to scientists and communities and takes into account ethical, legal and social issues associated with HGP [4]. Hence, widespread and detailed knowledge of the human genome is the first step in treating more than 3000 human genetic diseases, thereby enhancing human health in the future [28]. In [29] claimed that the United States government has put eight main goals of HGP from 1998 to 2003 namely:

i. Human DNA Sequence
ii. Sequencing Technology
iii. Human Genome Sequence Variations
iv. Technology for Functional Genomics
v. Ethical, Legal and Social Implications -ELSI
vi. Bioinformatics and Computational Biology
vii. Training

In [30] also debated the strategies of the Whole Genome Shotgun (WGS) in order to counter public criticisms of radical, unproven and failed HGP. Indeed, WGS succeeded in achieving its goal of over 99% of the genome sequence used. According to [31], the targets and achievements of HGP between 1990 and 1995 were to know in detail about genetic linkage maps, physical maps and DNA sequencing technology and not to forget the new knowledge contributed in biomedical fields through the Combined DNA Index System (CODIS). This CODIS database is very useful in the field of forensic science which enables the identification of individuals through fine samples such as saliva, hairs, bloodstains, tissues and semen to solve criminal cases [33]. In addition, it also has opened up a new space in the field of anthropology to identify the origins of humans involving races, areas, genetic diseases and many more [33-36]. This is also significant in human brain function analyses [37] such as a tool development in determining all brain cells, their connections and brain-related signals

which have been conducted by US Brain Research through the initiatives of Advancing Innovative Neurotechnologies. Moreover, in [33] has listed five advanced research based on HGP i.e. the International HAPMAP Project, 1000 Genomes Project, DNA Fingerprinting, Forensic Analysis and Applied Genetics. Meanwhile, in [38] conducted a study on Human Variome Project (HVP) that aims to collect and identify all genetic variations that affect human health.

According to [39-40], such projects have provided comprehensive descriptions of general human genetic variations by using the entire genome sequence. This will enable the process of differentiating individual genome sets from various populations and genetic distributions around the globe and their impacts on genetic disease research. Next, in [41-42] focus their attention on medical aspects particularly on the treatment of certain diseases such as cancer among women as well as overall human health. In [37] through his article titled Twenty-five Years of Big Biology have listed six lessons learned from HGP namely embracing partnerships, maximizing data sharing, planning data analysis, prioritizing technology development, addressing societal implications of advances as well as being audacious yet flexible. This is supported by [43] with the existence of MGP ELSI Programme (Ethical, Legal and Social Issues). Therefore, modern technology development of MGP-based needs to be in line with ethical aspects of law and humanity that has to be taken seriously so that it does not harm humans and environment.

Ian Whitmarsh and David S. Jones have collected and edited some writings in their work titled What's The Use of Race*?*which is related to the interests of nation as well as its relationship to modern genetics. According to the researchers, the 21st century is a period of genetic research that unlocks the mystery of illness, enhanced diagnosis and treatment. The century also symbolizes the interpretation of evolution mysteries and enhancement of human knowledge [44]. In [45] added that genomic research is a profitable future research for genomic-related companies because health value is highly regarded by humans to achieve good health through DNA profiles. This suggests that human genome research in the genetic field nowadays leads to a new era in modern biotechnology, which is seen capable of enhancing the quality of life. Nevertheless, various biotechnological and community challenges have to be pursued by the biologists and community as the human genome

research is highly sensitive to ethical, legal and social implications (ELSI) and religious beliefs [46-48].

4. HUMAN CLONING AND EUGENICS

The next issue relating to human cloning involves reproductive and therapeutic cloning [49-52]. In [53] defines a clone as a group of genetically identical cells or organisms derived from ancestors through asexual breeding or the resulting product resembles the original model in terms of functions, features and so forth. Meanwhile, in [54] define clones as copies of various organisms that have the same DNA as the original organisms. Furthermore, [55-56, 49] stated that the word clone comes from the Greek word 'klwn' which means twigs referring to vegetative reproductive occurring in plants involving asexual reproductive method. Nowadays, cloning is not only specific to plants but it also occurs in other organisms such as animals and humans. In addition, cloning is defined as a description, process or act of producing a clone [57]. In [56] stated that cloning is a gene multiplication technique that produces the same offspring irrespective of physical or personality inheritance. However, it has been identified that the main factor of human cloning rejection is that it violates unique human genetic rights of individuals [49, 55]. In [58] on the other hand, stated that human cloning is considered as a form mocking religious beliefs. In general, Islam strictly prohibits human cloning for the following reasons [59]:

i. Humans are created by Allah (SWT) that is completely entitled to all humanity.
ii. It brings harm to nature and family system.
iii. It conflicts with the *sunnatullah* (proclamation of the universal system and order) where Allah (SWT) has created humanity with wisdom and unique.
iv. It happens outside the limits of Islam i.e. legal marriage.

Next, in [52, 56] debated the impacts of human cloning on reproduction, aging and death despite human enhancement and general health. According to [52], reproductive cloning refers to the use of Somatic Cell Nuclear Transfer (SCNT) in order to produce human embryo for implantation into the womb that will produce an infant who has the same genome with the nucleus donor. Nevertheless, the therapeutic cloning uses the same method with reproductive cloning i.e. SCNT yet the resulting human embryo is merely used for research or production

of stem cells that is ultimately destroyed. According to religious, ethical, moral and legal views, human cloning is considered a threat to human life as the outcome will definitely affect family ties. The reason is that it will lead to violation of natural human nature which has been perfectly established by Allah (SWT) i.e. through legitimate sexual relationship between a husband and a wife. Not only that, this certainly involves the question of the pillars of faith. As a matter of fact, the human cloning for reproductive will contribute to denial of the concept of God, loss of kinship and lineage, destruction of family institution, procreation of children outside of marriage and corrupted humans. Muslim scholars worldwide as well as religious experts of other religions like Christians and Jews refuse human cloning to be regulated [60, 56].

However, the forbidden only involves reproductive cloning, while therapeutic cloning is permissible if the procedure is in line with the requirements of Islamic law [61]. This is also in accordance with the comparative study of human cloning ethics from Western and Islamic perspectives [62-63, 49, 55]. It has been decided in a legal and scientific seminar held in Jordan that the use of human genetic materials is allowed in medical studies to treat and prevent illnesses. Meanwhile, in [64] suggested both cloning i.e. reproductive and therapeutic have to be banned on the ground that humans need to preserve dignity even though it means to improve the standard of human quality. In the West, human cloning has brought many problems and humanitarian issues involving the collapse of marital institutions, genetic disorders, promoting adultery, lesbian and homosexual acts [60]. In [49, 55] adds that human reproductive cloning is often associated with the concept of *maslahah* or public interest however; the application of *maslahah* needs to be considered according to the *maslahahdaruriyyah* which is the highest in hierarchy. An analysis made against human reproductive cloning has found that it brings more damages. Therefore, human cloning involving reproductive cloning is strictly prohibited in Islam while therapeutic cloning is permitted as it benefits and contributes to research and production of medicines to treat diseases.

Many understand that modern genetic application is intended to safeguard the welfare of humans in order to improve the standard of humanity, thus leading to eugenics [65]. Eugenics is a set of beliefs and practices that aims to improve the genetic quality of the human

population. The term was coined by Sir Francis Galton in 1883 and for him, it regards the improvement of human germplasm through better breeding [70]. In addition, such practice also refers to human improvements by altering genetic composition either producing positive or negative eugenics [66]. On the other hand, in [53] defines it as a method of study to produce a better human race through selective breeding and breed research. This is in accordance to [67] who stated that eugenics is a heated debate in the field of pharmaceutical and biomedical referring to future human improvements using recombinant DNA technology, cloning and Pre-implantation Genetic Diagnosis (PGD). Additionally, in [68-69] stated that eugenics is a change of humanity through the evolution of engineering and science on the improvement of human genes i.e. selective breeding. Throughout history, it is evident that eugenics is associated with wars and conflicts as the ones happened in Rwanda, Congo and Darfur where the intention was reducing the victims' genetic contribution and propagating their own genes [70].

Modern genetic age is often associated with eugenics as genetic technology directly affects options of breeding for the next generation. This is done by selecting and producing valuable genotypes for the benefit of society. In other words, disadvantages and weaknesses are disregarded and only the best to be maintained in the present life. Fundamentally, this concept is contradictory to the planning of Allah (SWT) that has created men and women as company for one another and to act as His vicegerents on earth. [71-72] stated that eugenics directly affects women's rights through pre-natal diagnosis. In [73] noted that there are some arguments in support of eugenics that can make children born healthier, give freedom in breeding, reduce the dysgenic effects in society, low cost treatment and the latest evolution of human beings. However, some opposing arguments highlight that eugenics causing destruction of embryos and fetuses, reducing the scope of selective breeding, changing human nature, pressure on society, injustice, discrimination against disability and suffering [74-76].

5. CONCLUSION

In conclusion, ethics in scientific research alone is unable to solve human genetic issues that may emerge. All these ethical disputes must be resolved through comprehensive Islamic guidance as the achievements in modern science are directly and indirectly related to religious

creed. Therefore, the integration between modern science and religion is seen as the best solution as it will significantly preserve the upright *fitrah* (primordial human nature) of human beings.

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