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Evolution of Eugenics: A Review Through History and the Role of Ethical Boundaries Today

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Abstract

Today, when technology is opening doors that we didn't know existed, it is important to enforce laws to ensure that every novel idea leads to the welfare of the society and not cause harm in any way. The discovery of Eugenics came as a revolution where the idea of improving the quality of inheritance in humans has aided in the development of various Assistant reproductive techniques, cytogenetic and molecular diagnostic methods, gene testing etc. Although a revolutionary idea, history holds evidences of how science can turn people blind if ethics don't come into play. History may have instilled a stigma against any practice associated with the word genetic, but understanding history and the emphasis of ethics today can help in overcoming that. Genetic counselling is one such field where negative eugenics can take over and give deleterious powers to the physicians, which reiterates the importance of ethical interference.

Keywords: Eugenics; Ethics; Genetic Counselling.

Introduction

Eugenics originated as a philosophy attributed to the social cause of improving the quality of the human race by bearing healthier offsprings. The word eugenics is derived from the Greek word "*eu*" which means good or well and "*genos*" which means born. (Garver. B, 1991) The word eugenics was coined by Francis Galton, in 1883. Eugenics can be justified as a branch of science because of his efforts at formulating its fundamental elements. Breeding of livestock for superior quality of meat or plants for better yield of crop had long been in practice before the term eugenics had come to play. The idea of eugenics was to apply that in terms of human population as well. By minimising or maximising the chances of inheriting certain genes, the progeny line could be of a higher quality with only "desirable" genes. This systemic effort of minimising the transmission of certain undesirable genes was termed as negative eugenics while the effort to increase the chances of inheritance of the desirable genes was called positive eugenics. (Garver. K, 1991) Although the idea of improving the quality of human race came as a revolutionary idea, history holds evidences of how science can turn people blind if ethics don't come into play.

History

Eugenics in India

The idea of selective breeding existed in India long

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before the westerners had discovered eugenics. The concept of caste system basically evolved out of the idea that people of the same calibre and profession bred to birth improved progeny. (T.N. Roy, 1927) The stringent rules when it came to abstaining from inter caste marriage was due to the fear of toppling the purity of the lineage. Nevertheless, this practice was born out of religious influence and various social obligations and not backed by any science. (T.N. Roy, 1927) The prevalence of consanguineous marriages also was the result of this practice. Even to this day, Hindu families prefer same caste marriages, although it has more so to do with the ongoing social obligation than the understanding of science behind it.

Origin of eugenics

Sir Francis Galton, Charles Darwin's cousin was influenced by Darwin's theory of evolution. As more and more people began to support Darwin's idea of evolving the society, which is now known as social Darwinism, and the increasing awareness of Mendel's laws of inheritance paved way for Galton to back his theory of selective breeding to improve the human race with scientific evidence. Coupling Mendelism with human breeding reiterated the notion that humans were determined solely by the genes, and the influence of other environmental factors was frivolous. (Garver. K, 1991; T.N. Roy, 1927)

Negative eugenics in United States and Germany

Soon, the wave of eugenics spread across England, most of Western Europe and North America. The movement gained larger momentum in the North America which was headed by Charles Davenport. In an effort to apply Mendelian principles to human population by selectively breeding the "undesirable" traits out, Davenport established the Eugenics Record Office (ERO) in 1910, which would overlook the goals of eugenics. (Garver. K, 1991; Vizcarrondo F. E, 2014; Yuehtsen Juliette Chung, 2014) By studying large family pedigrees of people who carried certain undesirable traits, inheritance patterns can be identified. Since their goal was to improve the quality of individuals, a scientific evidence as such would help in justifying government policies suggesting involuntary sterilization or institutionalization. (Garver. K, 1991; Kevles D. J, 1999; Norrgard, K, 2008) The movement gained immense popularity which soon became a public health concern which was backed by not only scientists, but also doctors and lawyers. Although the idea of eliminating undesirable traits seemed fairly justified, the traits that the ERO was after were far from having a genetic basis. Physical disability, criminality, prostitution, destitution, alcoholism, various mental disabilities were considered as some of the traits that were considered to make the human unfit for survival. (Kevles D. J, 1999; T.N. Roy, 1927) For the next several years, the ERO screened the population for the various undesirable traits and strived to prove that these complex traits were in fact influenced by single genes and exhibited a Mendelian inheritance pattern. As the eugenicists gained public support, the sterilization law was passed which sterilized over 60,000 Americans. They even passed stringent immigration laws which prohibited immigrants from entering their country. The movement slowly died down by the 1930s. (Kevles D. J, 1999; Norrgard. K, 2008).

It was only then that the eugenics movement was picking up in Germany. It started off for the future of Germany since the concept of social Darwinism brought out concern in the minds of Germans that the socially elite who were so-called superior in race were away in war while the unfit class produced more unfit offsprings. Although it started off in the name of nationality, it soon became a movement against race. The blacks, Jews and eastern Europeans were considered as an inferior race, and the eugenicists took upon themselves the job of race hygiene. They made associations with the officials which gave them power to exercise their ideas freely. They took extreme measures such as annulling all the mixed marriages in their colony in southwest Africa and forbidding civil rights to those involved in any. They collected hereditary data from all the mental hospitals and institutions and falsely used the information in exterminations. Once the Nazis ascended to power, the then scientifically backed eugenic movement became a socio- political movement aimed at differentiating the unworthy races from the worthy Aryan ancestry. In the name of race hygiene many programs were set into motion such as euthanasia, involuntary sterilization and genocide which lead to the infamous holocaust where millions of Jews were killed. After those ghastly events, the judiciary had come to a realization that strict laws were necessary to overlook research involving human lives. (Norrgard. K, 2008).

Eugenics today

The scientific world is no way oblivious to the inexcusable events in the name of science that had violated not only the individual rights of people

but also cost millions of lives. So does this mean that eugenics was a bane to mankind? The eugenics movement started off as a utilitarian discovery but the lack of ethical boundaries opened the Pandora's Box of catastrophe. History teaches us the importance of ethical laws to overlook scientific progress. The fundamental interest of both biological sciences and ethics lies in human nature. While scientific studies strive towards finding the basis of human life and ways to better it, ethics undertakes the duty to monitor what is right and just for the humanity. The idea of eugenics was the improvement of hereditary qualities of the human race, which when practiced lawfully benefits the society. Today, eugenics is being applied in various fields.

Eugenics in gene therapy

Gene therapy is an experimental treatment procedure where genetic material is incorporated into the genome to work as compensation for abnormal genes or produce certain beneficiary proteins. Genetic disorders or diseases that are associated with abnormal genes or arise due to genetic mutations are of high incidence and lead to different sorts of physical/mental disabilities or can even be fatal. (John Harris, 1993) By eliminating the abnormal gene or by substituting the genome with healthier genes, the disease or disorder can be evaded, although it seems like a revolutionary idea, it is still in a nascent stage. Gene therapy can be either performed on the somatic cells or the germ-line cells. Although somatic cell gene therapy is still acceptable, germ line gene therapy still remains controversial and has several ethical implications. Today, CRISPR is the most promising gene editing methods which is still not accessible openly since off-target mutations can be seen even though the technique is extremely accurate. While the concept of editing the disease causing genes out sounds like an ideal move, the unprecedented consequences that might arise still remain a major concern, especially in germ-line gene editing where the a little tweak might put the entire lineage in a fix. The concern that lies with CRISPR is not with the technology but with the ethics where individuals get the liberty to control their familial heredity leading to eugenics at a personal front. (Osagie K. obasogie, 2018).

***In-vitro* eugenics**

Stem cells have been in the forefront of the research community. It provides great understanding of the differentiation and development that occurs in humans and also paves way for treatments for diseases such as diabetes, Parkinson's disease and even cardiac diseases. The biggest concern that still remains unanswered is about the embryonic rights. Somatic Cell Nuclear Transfer is a reproductive cloning technique where DNA is introduced into an oocyte whose nucleus is removed. Although reproductive cloning remains prevalent in animals, it is still not feasible for human applications as there is no complete understanding of the mutations that somatic cells might store which can lead to evolutionary harm to the human race. The use of Foetal stem cells in research also remains controversial, although it is permitted only after the abortion of pregnancy is decided. The advent of induced pluripotent stem cells (iPSCs) where somatic cells are induced with pluripotency by using viral vectors (adenovirus, retrovirus) comes with a relief to ethical constraints on stem cell research. Recent studies are directing to the possibility of creating viable human gametes from stem cells. In fact, in near future, scientists may be able to produce gametes in vitro sourced from somatic cells which contain genomic DNA, which is already being demonstrated in mice as of now. The possibilities remain endless in regard to stem cells, if and when this becomes a reality; it would open doors for reproductive opportunities for infertile individuals and even in same-sex marriages. It is even possible to fuse the stem cell derived gametes and crossing the embryo with another embryo and so on to create multiple generations of humans in *vitro* which could help in studying heredity and other genetic aspects without actual individuals being involved. (Sparrow R, 2014) Stem cell research is filled with latent potential, but it is important to keep it bound by ethics for that very reason, as the consequences remain unknown and it is shrouded by the possibilities of eugenic mishaps.

Eugenics in reproductive medicine

Earlier, before technology had evolved to what it is today, conceiving was thought to be a decision of fate. But today, various procedures have been developed which assist individuals in conceiving a child who otherwise cannot conceive normally. A myriad of procedures starting from in-vitro fertilisation, artificial insemination, donor conception, ovulation induction, gamete intrafallopian tube transfer or even surrogacy are all grouped under Assisted reproductive treatments. Eugenics echoes in the background of

these procedures when the technology interferes to assist the fertilisation, the egg, the sperm and the embryo formed are screened and selected based on their potential. (Lachmann. P, 2001) Prenatal screening also is widely used today to screen for possible disabilities or other genetic disorders. The information coming from the testing bears a certain responsibility to both the parents and the medical personnel. Screening a disability before birth does give an option of avoiding bringing disabled foetuses to full term informatively. (John Harris, 1993; Lachmann. P, 2001) Nevertheless, prenatal diagnosis provides an opportunity, to screen the foetus of any anomaly associated with the genetic makeup giving an option to terminate the pregnancy with informed consent. While in case of reproductive techniques such as IVF, the genetic qualities of the embryos are analyzed by a procedure called pre-implantation genetic diagnosis where the embryos with superior qualities are prioritized for implantation. This mentality comes as an irony considering the society shames history for the eugenic practices while implicating genetic superiority. Even though the decision rests in the parents, the very option of a not giving birth to a disabled child has a whiff of eugenic air around it.

Genetic counselling

Genetic counselling is a nondirective communication process where obtaining precise and comprehensive information helps individuals in making an informed decision. It involves assessing the patient history, medical records and analyzing the recurrence risk of hereditary diseases. Genetic testing and genetic counselling are eugenic in principle, but they can be distinguished from the misguided incidents of the 20th century based on the fact that they are done based on informed consent. It can be said to be a form of modern eugenic era where every procedure is practiced based solely on the consent of the individual while upholding the individual's rights. Strict ethical laws are exercised to ensure that the only goal of the modern eugenics is to minimize the incidence of diseases by cure or prevention.

Ethics and philosophy of genetic counselling

The medical field demands and paves way for many ethical issues due to its nature, but the field of genetics, owing to the scientifically backed mishaps of the past, calls for questionable aspects with respect to the applications in the field. (Allison K.H, 2017) The entire philosophy of genetic counselling is to provide any assistance possible to the patients in regard to understanding the risks associated with genetic disorders and other genetic conditions, diagnosis, prognosis and the management of the genetic disorders. Ethical principles are fundamentally built about four major aspects: autonomy-where the individual's rights are to be respected at all costs, beneficence-where the decision must be in the favour of the patient, harmless-where all actions must only benefit the patient and in no way harm them and justice- where no bias or discrimination should come into play with respect to making the resources available to the patients. (Armand M.L, 2006; Muthuswamy V, 2011) It is the moral responsibility of the counsellor to not withhold any information about the patient from them and to maintain transparency throughout the process. Confidentiality is a major hallmark in the field of genetics. It is essential to protect the patient's personal information and even medical records since there is a risk of stigmatic misuse of the information. The basic ethical laws are same throughout the world, but they are adapted to suit the social backdrop by various countries and modified to better suit their population. For example, while countries such as Japan, Singapore and china have almost unrestrictive policies with respect to stem cell research, Australia and South Africa hold a ban against all reproductive cloning, although therapeutic cloning and use of embryos that are unused after assisted reproductive procedures is permissive under the law. (Dhar D, Hsi-En Ho, 2009) In India, any research involving reproductive cloning, human germ line or even xenogeneic cells is against the law. Revealing the gender of the foetus is a common practice in the United States and other western countries but in India, according to the law passed by the government, revealing the gender of the foetus is banned. This is due to the socio-political differences seen in the various populations. In India, unless the only treatment of preventive option is gene therapy, it is prohibited from use. There are strict laws against eugenic genetic engineering where any sort of enhancement or alterations in terms of the genetic makeup of humans is involved. (ICMR guidelines, 2017).

Conclusion

It is of utmost prominence to remember before applying the philosophies of eugenics today that, while it is important to cure diseases that lead to physical/mental disabilities or have painful fatal

consequences, we do not have the need to enhance the a normal individual, even though it is permissive. (John Harris, 1993) Resources today such as gene therapy, CRISPR technology and even stem cell therapy are permissive of enhancing the human genome to create so-called perfect individuals. The availability of such technologies may encourage people to design babies from choosing the eye colour to intelligence. (Akrami SM, Bereshneh AH, Nejad AS, 2015) Tampering with nature and trying to play god may have unforeseen consequences which is why it is necessary to govern every activity in the field to ensure that no individual is harmed in anyway. Eugenic practices out of free will or due to legal enforcements ultimately lead to the same goals of improving the in the long term. Eugenics that is observed today is due to various factors such as the increased accessibility to assisted reproductive procedures, awareness about genetics and readily available preventative medicine. The sad reality is that the genetic medicine only benefits the upper class since prenatal diagnosis and assisted reproductive techniques still remain expensive, gene therapy is even more so. The basis of Ethics is pillared by philosophy and logic and cannot be shadowed by taking into account the general consensus. (LA chmann. P, 2001) By focusing the eugenic principles at restoring the normal healthy state of individuals exercised under strict ethical laws with equal opportunities for every individual without any economical and social barriers, though it seems utopian, will hopefully prevent eugenic disasters.

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