Observation of Dominant and Recessive Character in Humans

Nikesh Lagun

St. Xavier's College, Maitighar, Kathmandu, Nepal
Submitted 30 November 2023

Abstract

The majority of the information about our close friends and family members is known to us. Therefore, it's a wonderful idea to gather phenotypic data from family and friends to observe dominant and recessive traits. With few exceptions, phenotypic traits are the morphologically apparent traits that are dominant and recessive aspects of phenotypic behavior seen in both males and females. This study discusses a few prevalent and significant phenotypic traits. Curly hair, brown eyes, widow's peak, dimples, hair on fingers, right-handedness, and free ear lobe are a few typical dominant characteristics taken into account in this study. Recessive characteristics include straight hair, blue eyes, absence of widow's peak, absence of dimple, absence of hair on fingers, left-handedness, and attached ear lobe. The study, which included a balanced cohort of twenty people, reveals complex genetic interactions, defies expectations by demonstrating the emergence of recessive traits in the absence of dominant counterparts, supports established theories regarding handedness, hair type, and eye color, provides a nuanced perspective on traits influenced by hormones, emphasizes the need for more research into the genetic basis of dimples, and highlights the dominance of the right-handed gene globally. These findings offer important insights into the complex genetic landscape that influences phenotypic diversity and advocate for additional research using pedigree analysis to understand and treat hereditary illnesses.

Keywords: Phenotype, dominant, recessive, gene,

Introduction

1.1. General Background

Throughout history, several theories have been proposed to characterize heredity. The most prevalent and traditional idea is that personalities are passed along from parents to children through miscible bodily fluids, such as blood. The father of genetics, "Gregor Johann Mendel," proposed that reproductive cells transmit genetic units, which account for inheritance. He put an end to the inheritance debate. After many years of study, he developed principles that precisely characterize heredity and inheritance using the garden pea, Pisum sativum. Known as "Mendel's laws of inheritance", Gregor Johann Mendel provided the first scientific explanation of inheritance. Phenotype refers to an individual's outward embodiment of any trait. The genetic makeup of an organism is known as its genotype. The three laws that comprise the law of inheritance are the law of dominance, the law of segregation, and the

law of independent assortment. Mendel's Inheritance Laws may be summed up as follows:

- **Law of Dominance:** It states that out of two traits of the parents, only one trait appears in F_1 generation. A dominant trait is manifested, whereas a recessive trait is concealed in F_1 generation.
- **Law of Segregation:** It states that two alleles of a trait remain together in heterozygote without contamination but they separate or segregate at the time of gamete or spore formation or meiosis. It denotes the purity of the gametes for that characteristic. Thus, this concept is also known as the law of gamete purity.
- **Law of Independent Assortment:** It states that when two pairs of contrasting alleles are present in parents, they are inherited by offspring in which, one pair of alleles are independent of another pair, they do not remain linked and assort randomly. The sole explanation for this law is a dihybrid cross.

Mendel crossed two pea plants with different traits—one tall, and one dwarf—in this experiment. He named the first generation of offspring "F_1 progeny" after seeing that they were all tall. After cross-pollination, self-pollination was induced, and a 3:1 ratio between tall and dwarf plants was observed (as shown in Fig. 1).

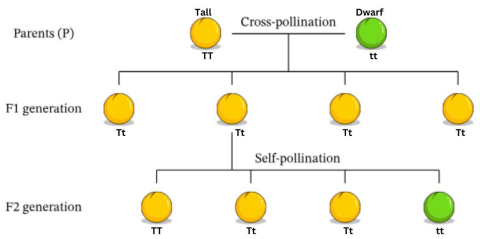

Fig.1: Cross between pure tall and pure dwarf (source: nagwa.com)

In this case, the tall trait is exhibited in both the first and second filial generations due to its greater superiority and dominance over the dwarf trait. Most likely, it also applies to people. The same theory also holds for humans, where features including skin tone, eye color, handedness, hair type, dimples, widow's peak, and body hairs are categorized as dominant or recessive depending on their capacity to dominate.

1.2. Objectives of the Study

- To observe the dominant and recessive characters in human beings.
- To research human inheritance according to Mendel's rule.
- To research the principle behind the phenotypic traits.
- To research genes and the genetic traits that parents pass on to their children.

1.3. Limitations of the Study

There were a few situations while studying the gene and its inheritance in research projects. Among them might be:

- The subject matter is so extensive that it is not possible to compile all the data into a single report.
- Since the research topic is hypothetical and minimal, actual data cannot be obtained for it.

1.4. Rationale of the Project

Anybody is intrigued about genes, which are little segments of DNA that define a certain character. Everybody is different from one another because of their bodies. Though they differ because of a variety of causes including DNA, mutations, etc., they also have certain comparable traits, such as phenotypic traits. Although members of the same species have the same genetic composition, they are not all

alike. Some people may have blue eyes, while others may not, and some people may have dimples. These aspects aroused our interest in learning more, so we conducted report research to get some information.

Methods

The research was carried out on November 10, 2023. Many techniques and procedures were used to finish this study and achieve the study's goals. For the study, both primary and secondary data were employed.

Primary data source:

- The questionnaire was distributed to friends and family members.
- People's phenotypic characteristics are observed.

Secondary data source:

- A synopsis of the journals and research guides.
- Surfing the web and reading blogs online.
- Magazines and reports were also scrutinized.
- Textbooks were also closely scrutinized.

Results

A total of 20 participants were studied, with 10 men and the remaining 10 females. The research reveals variances within a single species. The phenotypic characteristics observed throughout the investigation demonstrate that:

- **Hair Type:** This trait was discovered to be equal in both males and females, however more females than men have curly hair, and curly hair is dominant over straight hair.
- **Eye Color:** The common brown color present in everyone. This demonstrates that the brown color of the eye predominates over the blue.
- **Widow's peak:** This trait was shown to be equal in both males and females, albeit it is reliant on heredity. Most males display this trait more than females, and it is a dominant trait.
- **Dimples:** There were no dimples in any of the data. The lack of dimples is the most prominent feature. Cheek dimples are caused by a shift in a certain facial muscle. There is some genetic factor.
- **Hairs on fingers:** The evidence indicates that although women do have hairs on their fingers as well, men do have more. Males often have higher levels of the sex hormone testosterone, which is why they have more hair on their fingertips.
- **Handedness:** All men and women are right-handed, with the exception of two left-handed ladies. The left-handed gene is recessive, whereas the dominant gene is linked to right-handedness. The majority of people on the planet have stronger right hands than left hands due to genetics.
- **Earlobe:** The free or unattached earlobe is dominant and is more common in females than in males.

The study's data is displayed in the following table:

Serial Number	Number of people analyzed		Parameters	Number of dominant genetic traits		Number of recessive genetic traits	
	Male	Female		Male	Female	Male	Female
1	10	10	Hair Type	2	2	8	8
2	10	10	Eye Colour	10	10	0	0
3	10	10	Widow’s Peak	2	2	8	8
4	10	10	Dimples	0	0	10	10
5	10	10	Hairs on Fingers	7	6	3	4
6	10	10	Handedness	10	8	0	2
7	10	10	Earlobe	9	7	1	3

Table. 1: Dominant and recessive characters of male and female

A total of twenty people from the random population were observed for morphogenetic traits such as hair arrangement, eye color, widow's peak, dimples, hairs on fingers, handedness, and earlobe. It demonstrates how several usual dominant traits—like hair arrangement, eye color, widow's peak, and dimples—were not displayed, but the expression of recessive traits occurred. According to our survey, straight hair is more common in the population than curly hair, which is the dominating characteristic of the population. Although the widow's peak is the primary feature, our research indicates that the widow's peak absence is more noticeable. Furthermore, although the dimples are more noticeable when they are absent, their presence is still dominating.

Discussion

In summary, the study included 20 individuals, with 10 males and 10 women, representing a balanced representation. The examination of several phenotypic traits revealed some fascinating discoveries about this one species. Hair type, eye color, widow's peak, dimples, finger hairs, handedness, and earlobe attachment were among the characteristics that were looked at.

The research clarifies the intricate interactions between genetics and morphogenetic features within a population. It defies expectations by exposing situations in which recessive characteristics appeared when dominant traits, such as widow's peak and dimples, were absent.

The results concerning handedness, eye color, and hair type support known genetic theories and demonstrate how inherited these characteristics are. The effect of hormones, specifically testosterone, on the amount of hair on fingers offers a more complex picture of the hereditary components influencing outward traits.

In addition, the study highlights the surprising finding that the lack of dimples is more obvious than their presence, which calls for deeper research into the hereditary basis of dimples. The global patterns indicate that the prevailing tendency is to be right-handed, highlighting the genetic basis of right-handed dominance.

To sum up, our study opens the door for further research into the underlying processes

controlling the expression of morphogenetic features in human populations and provides important insights into the complex genetic landscape influencing phenotypic variety. With the use of pedigree analysis, this kind of research is easily understood concerning treating hereditary illnesses in the family.

Acknowledgments

The outcome of this project required a lot of guidance and assistance from several people. I am immensely grateful to receive constant encouragement, support, and guidance from them, who have helped me in finalizing my project work. I also thank all the organizations that provided the necessary information for this report.

Recommendation

Heredity's fundamental structural and functional unit is a gene. DNA is the component of genes. The character of the next generation is determined by this gene. The area of genetics and gene inheritance research is dynamic and complicated. The following actions are recommended concerning the investigation of genes and their inheritance:

- To succeed in the life sciences, one must have a solid understanding of molecular biology and genetics, including fundamental ideas like DNA structure.
- Thoroughly reviewing the body of existing literature, evaluating its conclusions critically, and identifying gaps in the field's knowledge is vital to the advancement of science and provide a basis for relevant and targeted research projects.
- It is essential to continuously refresh one's knowledge of genomics tools and be informed about the continual growth of technology in the field if one wants to stay at the forefront of genomics research.
- It is critical to acknowledge the broad and dynamic character of genetics and to keep up with the newest advancements to comprehend and make meaningful contributions to this influential discipline.
- Collaborating with specialists and placing a strong emphasis on efficient communication of techniques and findings through peer-reviewed scientific publications are essential for successful scientific endeavors.

References

- “Survey of Dominant and Recessive Character in Sonai College.” *Journal of Emerging Technologies and Innovative Research,* https://www.jetir.org/papers/JETIRFI06014. pdf. Accessed 11 November 2023.
- “Mendel's Laws of Inheritance - Mendel's Laws and Experiments.” *BYJU'S*, https://byjus.com/biology/mendel-laws-of-inheritance/. Accessed 11 November 2023.
- *Lesson Explainer: Monohybrid Inheritance* | *Nagwa*, https://www.nagwa.com/en/explainers/470191620628/. Accessed 11 November 2023.