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Exploring genetic traits among residents of Bharatpur, district Akola, Maharashtra

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Abstract

Genetic traits are characteristics or features that, can be determined by an individual's genetic makeup (genotype) and are passed down from parents to offspring through inheritance. Genetic traits play a pivotal role in shaping the physical characteristics of individuals. These traits are determined by the inheritance of alleles from parents to offspring. Through genetic recombination and assortment, unique combinations of alleles are generated, contributing to the vast diversity observed within populations. These traits are encoded in an individual's DNA and can be inherited in different ways, including through dominant, recessive, or polygenic inheritance. This study delves into the diversity of genetic traits among residents of Bharatpur Village, located in Dist. Akola, Maharashtra, aims to understand the diversity among its people. A total of 300 individuals from Bharatpur Village participated in this cross-sectional study, representing diverse age groups. Traits such as eye color, hair texture, and other heritable characteristics were assessed. The study reveals patterns of inheritance, including dominant, recessive, and polygenic traits, shedding light on the genetic diversity present among the individuals.

Keywords: Alleles, genotype, inheritance, traits

Introduction

Population genetics is a field within genetics that investigates genetic variance in populations (Noreen and Mardon, 2021) ^[2]. Population genetic studies leverage observable traits to explore genetic diversity and evolutionary processes. Indian populations endowed with unparalleled genetic complexity have received a great deal of attention from scientists the world over (Kashyap V.K. *et al.*, 2006) ^[3]. Genetic traits play a crucial role in the diversity of life on Earth and are the basis for evolution through natural selection. Genetic traits are characteristics or features of an organism that are determined by the genetic information inherited from its parents. These traits are encoded in the organism's DNA, which is composed of genes. Genes are sequences of DNA that contain instructions for building proteins, which in turn play various roles in the structure, function, and development of an organism.

According to Rostand J. and Tetry A. (1964) ^[9], the human population offers a unique chance to investigate the morphogenetic variance among endogamous populations residing in various ecological and geographical conditions. In genetics, alleles are different forms of a gene that can produce distinct variations in a particular trait. Dominant alleles "override" the expression of recessive alleles, meaning they determine the phenotype (observable trait) even in the presence of a recessive allele. Recessive alleles are expressed only when there is no dominant allele present to mask their expression. The frequency of a character in a population is related to whether its phenotypic effect is favourable or unfavourable. The aggregate genomic variety of a community is influenced by significant demographic events, and patterns of genetic diversity provide information about population history. (Lynn B. Jorde, 2003) ^[6].

According to Fred Gifford (1990) ^[1], for any trait, there will be both genetic and environmental factors whose alteration would affect the trait. Genetic traits can be either inherited or acquired through mutations. Inherited traits are passed down from parent to offspring through the process of reproduction. Acquired genetic traits result from mutations that occur in an individual's DNA during their lifetime. These mutations can be caused by various factors such as exposure to radiation, chemicals, or viruses.

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Acquired genetic traits may or may not be passed down to future generations, depending on whether they occur in cells that give rise to gametes (sperm or eggs).

The main aim of the present study was to explore the genetic traits present among the residents of Bharatpur Village, Dist. Akola, Maharashtra, and understand the genetic diversity within this population. Also to analyze the genetic data to determine the prevalence and distribution of specific genetic traits within the population of Bharatpur village.

Materials and Methods

A comprehensive survey of 300 individuals was conducted in Bharatpur village to study various genetic traits in humans. Participants ranging from 1 year to 75 years old were enrolled, including children and babies, for comparison across different age groups. The survey utilized a questionnaire format, collecting data on 28 traits while also capturing information such as name, age, qualification, contact number, and signatures. Traits examined encompassed a wide range, including eye color, size, shape, ear shape, nose shape, lip shape, and tasting ability using PTC paper. Additionally, participants were queried about

inherited traits in their families. Various materials were employed, including PTC paper for tasting ability and activities like hand clasping, rolling tongue, wiggling ears, and bending thumb to compare traits. External observations were made on traits such as earlobe shape, eye color, and foot shape. The data collected from each survey were analysed to understand the severity of traits across different age groups, providing valuable insights into the genetic makeup of the Bharatpur village population.

The following 28 genetic traits were included in the study

Hair line, hair curl, ear lobe, hypertrichosis, face shape, eye shape, eye color, eyebrow size, eyebrow shape, eyebrow length, nose shape, lip shape, cleft in the chin, hairs on fingers, bent finger, polydactyly (extra fingers or toes), thumb bending, foot shape, presence of dimple, ability to roll tongue, ear wiggle capability, handedness, presence of freckles, hand clasping pattern, color blindness, PTC tasting ability, pattern baldness, eyelash length.

Observation and Result

Table 1: Genetic trait distribution among different age group in the sample population

Sr. No.	Trait	Age Group					Total (Out of 300)	
		1-15	16-25	26-40	41-55	56+		
1.	Hairline	Straight	46	109	33	49	36	273
		Widows Peak	01	04	08	12	02	27
2.	Hair curl	Straight hair	47	53	31	42	49	222
		Curly hair	10	24	04	37	03	78
3.	Ear lobe	Free	79	56	113	00	08	256
		Attached	06	18	08	07	05	44
4.	Hypertrichosis	Yes (+)	00	00	00	00	00	00
		No (-)	-	-	-	-	-	-
5.	Face Shape	Oval	57	20	22	15	53	167
		Round	49	82	28	49	25	233
6.	Eye Shape	Almond	38	42	48	29	44	201
		Round	30	16	18	22	13	99
7.	Eye Color	Black	16	06	25	11	29	87
		Brown	40	70	36	18	49	213
8.	Eyebrow Size	Broad	32	72	23	46	03	176
		Slender	07	27	18	43	29	124
9.	Eyebrow Shape	Separate	25	68	112	17	59	281
		Jointed	03	04	03	02	08	19
10.	Eyebrow Length	Long	26	21	59	19	28	153
		short	45	10	66	21	05	147
11.	Nose Shape	With bump	04	05	03	05	04	21
		Without bump	14	87	134	08	36	279
12.	Lip Shape	Broad	05	12	20	09	22	68
		Thin	37	21	58	72	44	232
13.	Cleft in Chin	Present (+)	00	02	02	01	02	07
		Absent (-)	108	15	62	35	73	293
14.	Hairs on Fingers	Present (+)	00	00	95	37	23	155
		Absent (-)	20	10	25	60	30	145
15.	Bent Fingers	Bent	01	51	03	03	09	67
		Straight	10	60	103	41	19	233
16.	Polydactyly	Yes (+)	00	00	00	02	01	03
		No (-)	62	128	24	39	44	297
17.	Thumb Bending	Unable	128	20	28	40	35	251
		Able	04	26	08	10	01	49
18.	Foot shape	Curved	24	106	70	05	30	235
		Flat	23	04	12	08	18	65
19.	Dimples on Cheek	Present	04	06	04	02	01	17
		Absent	105	56	51	54	17	283
20.	Rolling	Can	12	43	35	23	15	128

	Tongue	Can't	17	28	64	53	10	172
21.	Wiggling Ear	Can	42	26	00	06	07	81
		Can't	29	57	39	46	48	219
22.	Handedness	Right	89	57	51	49	40	286
		Left	01	03	05	03	02	14
23.	Presence of Freckles	Present	03	00	03	03	01	10
		Absent	46	93	26	00	125	290
24.	Hand Clasping	Right thumb	41	77	75	38	10	241
		Left thumb	20	05	06	18	10	59
25.	Color Blindness	Red	-	-	-	-	-	00
		Green	-	-	-	-	-	00
26.	PTC Tasting	Can	30	30	25	36	11	132
		Can't	119	03	13	18	15	168
27.	Pattern Baldness	Full hair	10	58	64	61	15	208
		Thin hair	10	36	12	27	07	92
28.	Eyelash Length	Long	15	80	00	60	32	187
		Short	61	01	10	35	06	113

Discussion

The present study offers an extensive range of human physical traits across different age groups, reflecting the intricate interplay of genetics and environment. Research in genetics underscores the heritability of traits such as hair curl and ear lobe attachment (Polderman *et al.*, 2015) ^[8] while studies in anthropology and evolutionary biology have highlighted that certain physical characteristics may have evolved in response to environmental pressures or as signals of mate quality, such as nose shape and lip shape. (Shepherd, 2010; Lieberman, 2013) ^[11, 5].

300 individuals from different age groups among random populations were observed for morphogenetic traits. The observations from the study of 300 individuals in Bharatpur village indicate a notable absence or low prevalence of certain morphogenetic characteristics within the population. Hypertrichosis and red/green color blindness were completely absent; while cleft in the chin, polydactyly, freckles, and dimples were reported to be very rare. A few traits such as widow's peak, curly hair, attached earlobe, and wiggling ears were found and compared to what might be expected in a random population sample. These observations suggest potential genetic or environmental factors at play within the population of Bharatpur village that influence the prevalence of these morphogenetic traits.

Conclusion

The present research served as a valuable resource for exploring the multifaceted nature of human physical traits and their variations across different age groups. By considering the contributions of genetics, environment, and culture, we can gain deeper insights into the rich tapestry of human diversity and the dynamic processes that shape our outward appearance. However Further research could explore the underlying genetic, cultural, or environmental factors contributing to these observations.

References

- Gifford F. Genetic traits. Biol Philos. 1990;5:327-347. Netherlands: Kluwer Academic Publishers.
- Noreen K, Mardon AA. The inheritance of traits: From genetics to heredity. Canada: Golden Meteorite Press; 2021. ISBN: 978-1-77369-260-269.
- Kashyap VK, Gujral R, Sitalaximi T. Tracing the genetic imprints of caste origins in India. Hum Genet. 2006;118(6):694-703. doi:10.1007/s00439-005-0079-5
- Kulkarni SS, Chaudhari R. Genetic diversity and population structure of Maharashtra (India) populations based on 15 autosomal STR markers. Int J Legal Med. 2017;131(3):609-610. doi:10.1007/s00414-016-1507-5
- Lieberman DE. The story of the human body: Evolution, health, and disease. New York: Vintage; c2013.
- Jorde LB. Genetic variation and human evolution. Salt Lake City: University of Utah School of Medicine; c2003.
- Malhotra KC, Vasulu TS, Dubey B, editors. Genomic diversity: Applications in human population genetics. Berlin: Springer; c2007.
- Polderman TJC, Benyamin B, De Leeuw CA, Sullivan PF, Van Bochoven A, Visscher PM, *et al.* Meta-analysis of the heritability of human traits based on fifty years of twin studies. Nat Genet. 2015;47(7):702-709.
- Rostand J, Tetry A. An atlas of human genetics. London: Hutchinson Scientific & Technical; c1964.
- Kadam SS, Gade MB. Survey of dominant and recessive character in Sonai College. J Emerg Technol Innov Res. 2021;8(12).p.
- Shepherd J. The origins of facial diversity. Sci Am. 2010;302(2):76-81.