

Pedigree analysis

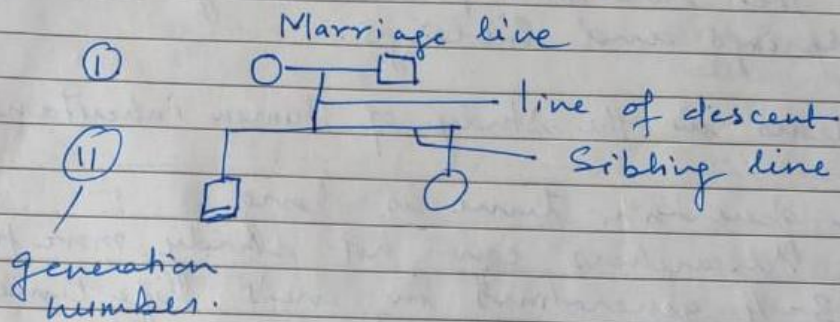
For PG. Sem II students

- ① Dominant ③ Autosomal } Key words
② Recessive ④ X linked }

Pedigree analysis describes the process of interpretation of family tree and pattern of inheritance of a particular trait through out a family. It is done in case of human beings and Pets.

Symbols used in Pedigree Analysis

- - Female □ male
■ - Person with a trait
⊙ - Deceased ♂ ♀ - Twins



Key Terms →

- | <u>Terms</u> | <u>meaning</u> |
|--------------------|--|
| 1) Pedigree | chart that shows the presence of absence of a trait within a family across generations |
| 2) Genotype | The genetic make up of an organism. |
| 3) Phenotype | The physical characteristics of an organism |
| 4) Autosomal trait | Trait that is located on a autosomal chromosome. |

Sex linked trait \rightarrow Traits that is located on a sex chromosome (X-Y)

Homozygous \rightarrow Alleles are identical

Heterozygous \rightarrow Alleles are non identical.

Importance of Pedigree Analysis - It is a very important tool for studying human inherited diseases like haemophilia and colour blindness.

It is also used to analyse the pattern of inheritance of a particular trait throughout a family. Pedigrees show the presence or absence of a trait as it relates to the relationship ~~and~~ among parents, offsprings and siblings.

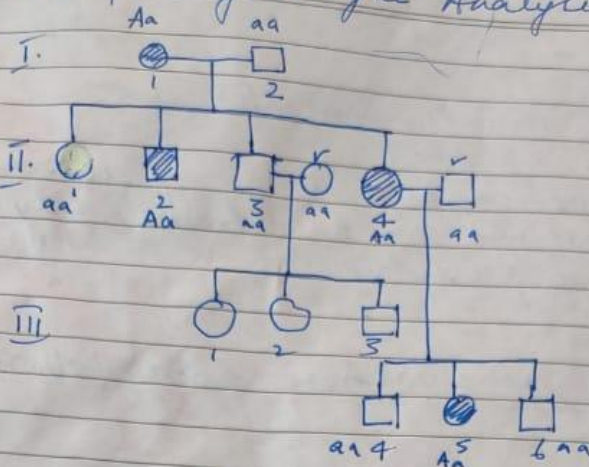
Problems in the study of Human inheritance -

- 1) The generation time is long.
- 2) ~~Research~~ researchers can not study more than 3-4 generations in one's life time.
- 3) The number of offspring is small.
- 4) Homozygous traits are very few.
- 5) Humans can not found in Pure breeding individual.
- 6) Human chromosomes is large.
- 7) Environment also plays a powerful role in traits and gene expression.

Advantage of Pedigree Analysis is in study of inheritance of genes from one generation to another.

Many diseases of human beings such as sickle cell anaemia, colour blindness, fused ear lobes, Haemophilia can be traced by analysing the family ~~tree~~ tree.

Examples of Pedigree Analysis

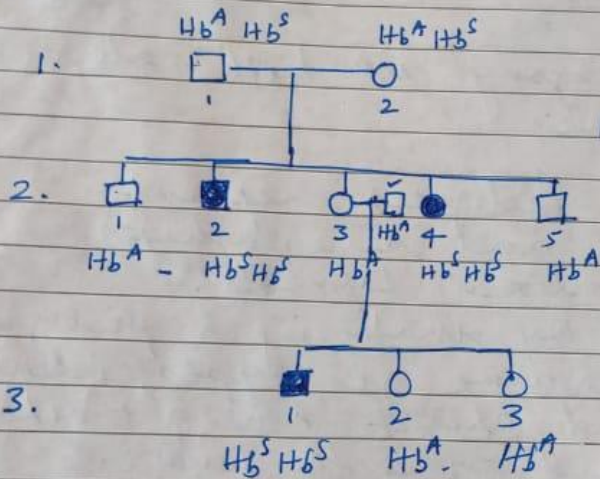


Picked symbols are outsiders

Aa - Heterozygous dominant

aa - Homozygous recessive

Autosomal dominant traits.



Both Parents are heterozygous.

II In this case the heterozygous condition

$Hb^A Hb^S$ is without any significant effect but carries the haemoglobin in Sickle cell RBC

when it becomes

Autosomal Recessive Traits homozygous

in 2nd generation $Hb^S Hb^S$ it shows the effect of Sickle cell anaemia.

The Autosomal dominant traits shows following results -

- 1) Affected individuals have at least one affected parent.
 - 2) The phenotype appears in every generation.
 - 3) unaffected offspring can be obtained only by unaffected parents.
- 2) The Recessive gene actions have following effects -

- (a) unaffected parents can have affected offspring.
- (b) affected progeny are both male and female.

Pedigrees represent family members and relationships using standardized symbols.

By analyzing a pedigree we can determine genotypes, identify phenotypes and predict how a trait will be passed on in the future.

The information from a pedigree makes it possible to determine how certain alleles are inherited whether they are dominant-recessive, autosomal or sex linked.

Recent advances in human gene mapping has also contributed in gaining knowledge about many advances in ~~is~~ genetically transferred abnormalities in human beings and pedigree analysis is one of the tool in knowing it.