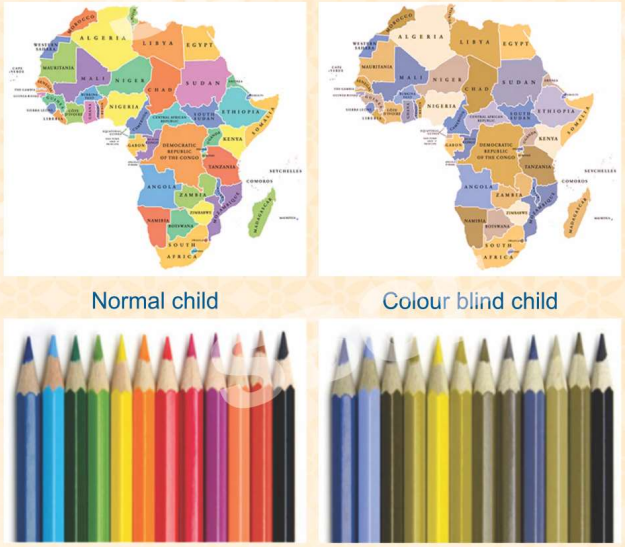
- They are unable to choose the right clothes for him and his family.
- They are unable to distinguish ripe fruit from fresh one, facing difficulties in choosing fresh vegetables, fruits and flowers.

2. Facing difficulties in school:

- Colour-blind children find it difficult to read charts, graphs, periodic tables used for study.



- Such children have difficulty recognizing colours in drawing.
- Other children make fun of him for not being able to recognize colours.
- Sometimes, because the teachers do not know, such children are victims of their anger or punishment.
- In sum, such children develop despondency and lack of self-confidence.
- Some courses that require normal vision, like transport, electric industries, army, pilot, software programming, film-making designing artist etc. cannot be selected as career.

3. Difficulties in selection when applied for government jobs:

- A colour vision test is required for several government jobs. This job cannot be gained if this test is not passed. People who are colour blind should be aware of this.

Why is it important to identify colour blindness early?

- If colour blindness is identified at an early age, we can help colour-blind children as follows.

How can parents help a colour blind child?

- Helping a colour blind child to choose clothes and colours.
- Writing the name of the colour on the colour pencil makes it easy for them to identify the colour.
- Remind them of the correct sequence of traffic signals so that they do not have difficulty driving after they grow up.
- Downloading some apps on the phone makes colour identification easier.
- Choosing a career that requires minimal colour recognition when the child grows up. So that he does not have difficulty studying.
- Some careers/jobs like transport, electric industry, army, pilot, software industry, filmmaking, designing, artist, etc. require colour recognition. Keep this in mind while choosing a career or job.

How can a teacher help a colour-blind child?

- Teachers can take special care if a student is found to be colour blind. Like using only white chalk instead of using different coloured chalk on the blackboard.
- Using patterns and labels wherever possible and avoiding use of colours.
- Label the colour of the drawing with its name.
- To ensure that other students in the class do not make fun of colour blind children and encourage them to help colour blind children.
- To take care and teach in such a way that they do not have difficulty learning due to not recognizing colours.

What is the treatment of colour blindness?

- There is currently no known treatment for colour blindness. There are some genetic experiments underway. However, it hasn't been effective yet. Colour blind glasses are available. However, it merely makes the colours brighter. but is unable to display colour that is unseen.

Initiatives taken by the Government:

504 Plan for colour blind children-

- Under the 504 plan, special attention is given to colour-blind children in primary and secondary schools. So that they do not have difficulty learning due to not recognizing colours.
- In June 2020, India's Ministry of Road Transport and Highways amended the Central Motor Vehicles Rules 1989 to enable citizens with mild to medium colour blindness to obtain a driver's license.
- The Supreme Court has directed the Film and Television Institute of India (FTII) not to exclude candidates suffering from colour blindness from its courses on filmmaking and editing and asked it to make changes to its curriculum instead.

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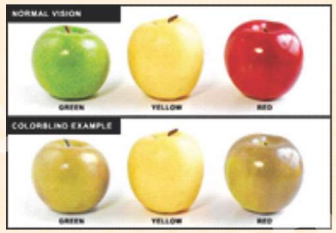
Facts of colour blindness/colour vision deficiency (CVD):

- The prevalence of congenital colour blindness is about 8% in males (8 in 100 men) and 0.5% in females (1 in 200 women) in the world. The prevalence of CVD varies between 2 % to 14 % in different studies.
- In one classroom, there is a chance of having one student with CVD.
- Due to the X-linked inheritance pattern, men are predominantly affected and women become the carriers of the abnormal gene.
- Worldwide, there are approximately 350 million people with colour blindness, almost the same number of people as the entire population of the USA!

What is Colour blindness?

- Colour blindness, also known as colour vision deficiency (CVD), is a condition that makes it difficult to see colours like blue, green and red or differentiate between them. Red-green colour deficiency is the most common type of colour blindness in which a person is unable to differentiate between red and green colour.
- Colour blindness was discovered by an English chemist named John Dalton in the year 1798. During the discovery, he was also suffering from colour blindness.



← Normal vision

← Colour blind vision

What are the causes of colour blindness?

- Colour blindness is mostly caused by genetic defects.
- Females have XX sex chromosome. Colour blindness is caused by a mutation in the genes of the X recessive chromosome.
- Mothers who have this defect can pass colour blindness to their offspring.
- A male has an XY sex chromosome. A male contains only one X chromosome. So, if a mother inherits a defective X chromosome, the son of such a mother becomes colour blind. But if a normal X chromosome is inherited, the son of such a mother is not colour blind. Thus, if the mother is colour blind, her son has a 50% chance of colour blindness.
- Such a mother is not colour blind herself. Because X is a recessive gene in it. This means that its effect is suppressed by her X dominant normal gene.
- Under normal circumstances, a daughter is not colour blind unless her mother is a carrier and the father is colour blind.
- If the mother is a carrier of colour blindness and the father is colour blind then the daughter of the parent becomes colour blind. But the chances of this are very less. Due to this, colour blindness is more common in males than females. Colour blindness occurs in 8% of males and 0.4% of females.
- This child has defects in the red and green cone cells of the eye. As a result, it cannot distinguish between red and green.
- Colour blindness is mostly due to genetic defects, but some other causes like accidents, chronic illnesses, hypertension, glaucoma, aging, diabetes, certain drugs, etc are responsible for colour blindness.

How many types of colour blindness are there?

There are three types of colour blindness.

1. Red-Green colour blindness:
   - Our eye has three types of cone cells: red, green and brown.
   - Because the red and green cone cells are either absent or defective, a person cannot tell the difference between red and green colour.
   - This is the most common form of colour blindness.
2. Blue-yellow colour blindness:
   - People with colour blindness, which is less common, are unable to tell the difference between yellow and violet or blue and green.
   - This type of colour blindness is not due to sex chromosomes but to defects in the cone cells of the eye.
3. Complete colour blindness:
   - It is very rare in which one can see only black and white. He does not see any other colours.
   - Complete colour blindness may occur if the retina of a person's eye has no cone cells or only one type of cone cell is present.

Since red-green colour blindness is the most common type, we shall go into more detail regarding it. Red-green colour blindness accounts for 99% of all colour blindness cases.

Red-Green colour blindness:

Red-Green colour blindness can be divided into four categories.

1. Protanopia : In this type of colour blindness, a person does not have red cone cells in his eye, so he cannot see the colour red.

Normal Vision

Protanopia

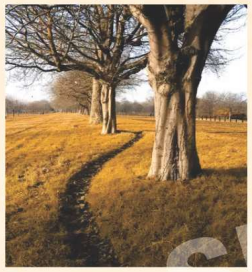
2. Protanomaly : Red cone cells are faulty in some persons. They do not perceive some shades of red as a result. However, such a person could see red to a certain degree.

Normal Vision

Protanomaly

3. Deuteranopia : Such a person cannot see the colour green because he lacks green cone cells in his eyes.

Normal Vision



Deuteranopia

4. Deuteranomaly :
   - In red-green colour blindness, it is most common.
   - A person with this type has improperly functioning green cone cells in his eye. This makes it hard for such a person to distinguish between different shades of green.

Normal Vision

Deuteranomaly

How do you diagnose colour blindness?

Colour blindness can be diagnosed by doing the Ishihara Test. This test consists of different coloured plates. Each colour plate has tiny dots. A number is written inside these dots, which has to be identified. The number on some plates can be seen only by a normal person, but not by a colour blind person.

Ishihara Plates

What challenges do people who are colour blind face?

1. Difficulties in day-to-day tasks:
   - They face difficulties recognising traffic lights correctly.

Normal Vision

Colour blind vision