



# COLORANTS USED IN PHARMACEUTICAL INDUSTRY CONSIDERATION WITH COLOR PSYCHOLOGY

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*Abstract* : Why does seeing the colour red make us angry? Alternatively, why does blue have a calming effect? That all has to do with colour psychology. Colors are always unique and express vitality, as well as sensations, perceptions, personality, emotions, psychological characteristics, disposition of feelings, etc. Psychology has long documented the impact or effect of colour on human function. According to colour psychology, the product's hue and its effects may also have an impact on how well therapy works. Pharmaceutical items include tablets, hard or soft gelatin capsules, lozenges, syrups, tooth pastes, ointments, and salves, among others, contain colourants. Red, yellow, and orange are connected with a stimulating effect on humans, whereas blue and green are associated with a tranquillizing effect, according to reviews and research studies on the perceived activity of pharmaceutical coloured medications. Depending on the colour of the medication, the clinical trials that evaluated how the colour of the medication affects its effectiveness differ. If you want to create a calm and focused environment, it's crucial to understand how colour influences our mood. (Several research have been done on the significance of colour in healthcare environments by lowering stress, medical errors, depression, length of stay, improving patient social support, communications in healthcare environment, circadian rhythms, and patients sleep.)

Key word: Color, Psychology, Disease, Industry, Pharmaceutical

## I. INTRODUCTION

According to US FDA regulations, a colour additive is any dye, pigment, or other ingredient that can give a food, medication, cosmetic, or the human body colour. The primary purpose of colourants or colouring chemicals in the pharmaceutical business is to provide pharmaceutical dosage forms or medications a distinctive appearance. Given that the visual look of specific dosage forms can be improved by employing appropriate pharmaceutical colourants, it would not be incorrect to refer to colourants as cosmetics for pharmaceutical preparations. The majority of colours have common meanings throughout a wide range of civilizations, with red typically being linked with strength and activity and blue and green with tranquilly. Because patient perception and mental processes are influenced by the hue of medicinal formulations, varied therapeutic responses may result. One of the fundamental components of dosage form design is the use of a certain colourant that can produce predetermined psychological effects that the audience as a whole can see. Research should be conducted to investigate whether distinct colours are related to and associated with particular moods, which can ultimately be used to identify psychological and emotional states. By harmonising the body's energy centres, known in ancient Indian medicine as the chakra, colour therapy is an alternative treatment that helps patients with their physical or mental health.



Fig. No 01: colored medicine

## II. PHARMACEUTICAL PREPARATIONS ARE COLORED MAINLY FOR FOLLOWING REASONS:

- A. Patient compliance: A lot of patients use colour to identify the recommended medication and the right amount. Enhancing patient compliance with coloured medicine is a crucial factor to take into account. (1)
- B. Identification: Colors can be used to distinguish between products with similar appearances that are part of the same product line or between product lines from different manufacturers (2). It formerly aided in the identification of a product during both its manufacturing and distribution stages. Colors can be used to distinguish between products with similar appearances that are part of the same product line or across product lines from different manufacturers. (3)
- C. Stability goal: Certain insoluble hues or pigments also have the added benefit of providing beneficial opacity when employed in tablet coatings or gelatin shells, which can help to maintain the stability of light-sensitive active components (ingredients) in the tablet or capsule formulation. Iron oxides, titanium dioxide, and certain aluminium lakes are among the pigments that are particularly helpful for this (4).
- D. Psychological goal: The study of colour is challenging due to the multitude of systems it is subject to, including the aesthetic, psychological, physiological, associative, and symbolic systems. The psycho physiological characteristics of colour have been discovered as a result of this. According to colour psychology, the hue of a pharmaceutical product affects how well a treatment works. The significance of colour effects is global. (5)

## III. CLASSIFICATION OF COLORANT USED IN PHARMACEUTICAL INDUSTRY:

- A. Organic dyes and their lakes
  - B. Inorganic or mineral colors
  - C. Natural colors or vegetable and animal colors
- D. Psychological goal: The study of colour is challenging due to the multitude of systems it is subject to, including the aesthetic, psychological, physiological, associative, and symbolic systems. The psycho physiological characteristics of colour have been discovered as a result of this. According to colour psychology, the hue of a pharmaceutical product affects how well a treatment works. The significance of colour effects is global. (6)

Natural colours, or the hues of plants and animals: Stability towards light is a key quality demonstrated by these compounds, some of which, like titanium dioxide, have a helpful opacifying potential. The widespread regulatory acceptability of inorganic hues is another significant benefit, making them particularly valuable and significant for global pharmaceutical enterprises. The general acceptance of natural colours is an advantage. (7)

## IV. IDEAL PROPERTIES OF A COLORANT

- Non-toxic, with no physiological activity. without containing any hazardous impurities.
  - Stable during storage since it is not impacted by light, hot climates, hydrolysis, or microorganisms.
- Pharmaceutical colourants ought to be compatible with drugs and not interfere with them; they ought to be unaffected by oxidising or reducing agents, pH changes, and other factors.
- Although it has ready water solubility, which is preferred in the majority of situations, some colours that are oil- and spirit-soluble are still required.
  - It shouldn't obstruct preparations containing the tests and assays to which it is subject. On to suspended particles, colourant shouldn't be noticeably adsorbed.
  - Taste and odour are unfavourable. (8)

## V. WHY DO COLORED TABLETS MAKE A DIFFERENCE?

The choosing of colours poses an exciting difficulty because these choices are frequently influenced more by art, intuition, and experience than by scientific research. The use of colour as a design tool is indirectly supported by psychological research, with a focus on how it encourages object memorization. (10)

Activating and deactivating one's spatial surface-based sporadic memory and stored semantic information, colour can enable medicine or dosage form discrimination if tablets or pills can be coloured to elicit specific, desired representations. (11)

Color is used to signal meaning to support this drug's potency and generate a desired patient experience that is involve part of psychology that plays with patients thoughts and perception.. While the medical industry is preoccupied with the package insert, the visual experience of the tablet effectively competes for the user's attention and memory.

When the hue is associated with the fantastic effects of the drug, patients respond more positively. For instance, the calming blue colour that promotes restful sleep and the vibrant red colour that is utilised for quick relief. The exploratory study discussed here evaluated which colours are preferred in different regions of the world in order to scientifically validate cultural differences in colour preferences as well as similarities. 11

## VI. THE EFFECT OF COLOR ON MOOD AND MENTAL HEALTH

**Blue colour:** People will sometimes refer to feeling down or melancholy as "having the blues" when they are sad or unhappy for some cause. It's interesting that blue was perceived as "the ideal hue" for serenity and tranquillity. The research study suggested that depending on the behaviour pattern of the patient, psychiatric treatment is given taking the patient's coldness or aggression into consideration if we are suffering from mental health, mental disease, or an extreme level mental health condition. Red is used to promote aggression, while blue is typically used to calm anger down.

**Green:** Green has significant benefits for your mental health. By surrounding yourself with green hues, you might feel restored and neutral. It is the main argument made by experts on why spending time in nature can help us maintain mental and emotional equilibrium. Green is associated with nature and is a calming colour, thus it is a representation of wellbeing and a soothing mindset.

**Grey:** The colour grey promotes feelings of strength, authority, and potential. All of these psychological impacts are necessary when we have a mental illness like anxiety, depression, or stress. It is employed to lessen anxiety and Brocken mentality. It is the colour that lies between black and white.

**Yellow:** Because it fosters mental creativity, the colour yellow has strong benefits on mood and mental health. Color The colour yellow is always associated with joy, clarity, and enthusiasm. Bright colours are typically utilised in children's commercials to grab the viewer's attention right away.

**Purple** is a hue that many females relate with because it has a gentle appearance and is frequently a welcoming colour. It can also evoke good emotions like peace and comfort. When we're feeling down, the potent combination of natural-looking, pure colours can bring mental clarity. 12

Red	Activates the circulatory & nervous systems.
Strong Pink	Acts as a cleanser, strenghtening the veins & arteries.
Pink	Activates & eliminates impurities from the blood stream.
Orange	Energises & eliminates localised fat. Helps address asthma & bronchitis.
Strong Yellow	Strengthens the body & acts on internal
Yellow	Reactivates & purifies the skin. Helps with indigestion & bodily stress.
Green	Acts as a relaxant.
Strong Green	Provides anti-infections, anti-septic & regenerative stimulation.
Strong Blue	Lubricates the joints. Helps address infections, stress & nervous tension.
Blue	Stimulates muscle & skin cells, nerves & the circulatory system.
Indigo	Helps address eye inflammation, cataracts, glaucoma & ocular fatigue.
Violet	Relaxes the nerves & lymphatic system. Addresses inflammation & urinary illness.

Table No. 01: The Effect of Color on Mood And Mental Health

## VII. PLACEBO EFFECT OF COLORED MEDICINE:

Imagine the burning and some cutes on the skin and treating the pain with a colored cream. Can you imagine the cream of color white? Now imagine the color of cream it red. Can you trust the cream to work as well? This all psychological matter that the color can influence on treatment and management of several disease.

The popular example in the placebo drug that effectiveness can be depends on the the color of the particular drugs which is mentioned on several literature. The clinical use of placebos is often reasonable by pointing to their central treatment effects. Proponents have also argued that the placebo effect can be amplified by manipulating the physical appearance and the color of the pill. (13)

Patients may trust their doctor or pharmacist, but this does not mean they will take the bitterest pill by only considering its action. Because patients undergo a sensory experience every time they self-administer a drug, whether it's swallowing a tablet or capsule, chewing a tablet, swallowing a liquid, or applying a cream or ointment. The scientist of the research field suggest that it might be possible to ensure that all the sensory elements of given medication work together to create positive perceptions that complement the medical attributes. They point out, however, that surprisingly little attention has been paid to this aspect of pharmaceutical formulation. (14)

As we've already seen in our review, colour influences how people think psychologically. Depending on the patient's perception of colour, some hues prompt fast recovery. For instance, research demonstrate that if a person who is regularly suffering from an illness like depression is given a maroon-colored antidepressant tablet, he won't enjoy it because his natural mind perception would make the drug's effectiveness appear less of that colour. Similar to how people perceive mild blue medicines, blue colour psychology promotes restful sleep since blue is a colour associated with tranquilly. Those with acid reflux might be reluctant to take a lime green tablet because it is frequently associated with the taste of citric acid (sour taste). All of these illustrations provide insight into drug colour in relation to medicine effectiveness and better results.

If someone has a headache, be patient. Dr. perspired that white coloured pills were the best headache medication. This distinct and "new" impression is most likely a result of the aspirin's white tint, which is a well-known headache medication that people have taken since infancy. They therefore believe that the coloured pill can treat their headaches. 15

Studies have repeatedly demonstrated that red and orange placebos generate or produce stimulant effects, while blue placebos produce depressing effects and work best as sedatives. Due to the association between orange and yellow with creativity, patients have reported sleeping more soundly after taking a blue capsule than an orange or yellow one. Compared to placebos in the colours of white, blue, or green, red ones appear to be more effective at reducing pain. Bright yellows are the most effective as antidepressants, although green and white also lessen anxiety and pain. 16

Recently, two studies indicated that people's perceptions of a prescription or specific pill, as well as their attitudes about the course of treatment, are affected by its hue even before they begin taking it, and additional research suggests that the experience sticks with them. In the first study, it was discovered that every time a person self-administers a medicine, whether it be by swallowing a pill or capsule, chewing a tablet, ingesting a liquid, or applying a cream or ointment, a sensory experience occurs. For instance, pink-colored tablets are more likely to taste sweeter than red-colored ones. Thus they should feel better taking pink tablets as opposed to red ones.

Researchers also discovered that the colour of the medicine had an impact on patients' feelings about taking it, as well as how they perceived it would affect their ability to get well or undergo treatment. Researchers noted that if a patient with depression is given an anti-depressant tablet in a maroon colour (a placebo), he will not enjoy it based on their perception level, and the medication will not work. It should not come as a surprise that the colour actually plays a significant role by conveying information about the medication's actual function. For instance, the majority of people believed that a soft blue capsule would guarantee a restful night's sleep. Moreover, green-colored medicines have a calming effect. because green is associated with nature. 17

According to the psychology of colour, the colours blue, turquoise, and green are tranquil and restful whereas red, orange, and yellow can have exciting and stimulating effects. Thus, colour psychology is the most crucial factor when doctors recommend a medication. 18

All of these outcomes highlight the brain's importance for physical and mental health. As studies using placebos have demonstrated that certain expectations can lead to clinically significant changes in health, it stands to reason that expectations sparked by a drug's colour can also alter a drug's and a placebo's reactions and effectiveness.



Fig. No 02: Placebo effect of medicine

**CONCLUSION:**

When considering colour psychology, colour is more potent and has a significant impact on how people think and perceive the world. Human beings respond, stimulate happiness, and calmness depending on their skin tone. Understanding colour psychology is crucial for the healthcare industry's management of psychological illnesses. Because studies have shown that a drug's or medicine's effectiveness depends in part on the colour or colours used. Ergonomics experts can apply the research from this review paper to create appropriate drug colours that assist drug distinction, therapeutic benefits, and medication adherence.

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