



RHODAMINE: SCIENCE & TECHNOLOGY

NEWS: The hidden dangers of Rhodamine B: a global and local perspective

WHAT'S IN THE NEWS?

Overview of Rhodamine B

- Rhodamine B is a synthetic dye recognized for its bright pink color, commonly used in industrial applications such as textiles, paper, and leather manufacturing.
- The dye is also utilized in scientific research for its fluorescent properties, making it valuable in laboratory settings.
- Despite its industrial utility, Rhodamine B is not approved for consumable products due to severe health risks associated with its use.

Health Risks Associated with Rhodamine B

- **Carcinogenic Potential:** Studies have shown that Rhodamine B can cause DNA damage, leading to genetic mutations that may trigger cancerous growths.
- **Animal Studies:** Research on animals revealed that prolonged exposure to the dye can result in the development of tumors in critical organs such as the liver and bladder.
- **High-Risk Groups:** Certain populations, including children, elderly individuals, and those with compromised immune systems, are particularly vulnerable to the dye's harmful effects due to their limited ability to detoxify harmful substances.
- **Additional Health Concerns:** Long-term exposure may cause allergic reactions, oxidative stress, and chronic skin pigmentation changes, particularly in sensitive individuals.

Global Actions Against Rhodamine B

- **United States:**
 - The U.S. Food and Drug Administration (FDA) has long classified Rhodamine B as unsafe for human consumption, banning its use in all food products.
 - In January 2025, the FDA reinforced its restrictions by prohibiting the dye's use in any food-related applications, citing mounting evidence of its carcinogenic properties.
 - The recent ban was driven by concerns over the exposure of children to Rhodamine B in candies, baked goods, and processed foods.
- **European Union:**
 - The EU has designated Rhodamine B as a substance of very high concern and has restricted its use in cosmetics and other consumer goods.



- As early as the 1990s, the EU banned Rhodamine B in cosmetics due to its potential carcinogenic effects and risks of skin sensitization.

Indian Perspective on Rhodamine B

- **Illegal Use in Food Products:** Rhodamine B has been illegally employed in India to enhance the visual appeal of various food items, posing serious health risks to consumers.
- **State-Level Actions:** Several Indian states have taken strong measures to combat the illegal use of Rhodamine B:
 - **Tamil Nadu (February 2024):** Banned the production and sale of cotton candy after samples tested positive for Rhodamine B. The state emphasized that the use of the dye in food products violates the Food Safety and Standards Act of 2006.
 - **Karnataka (March 2024):** Prohibited the use of Rhodamine B in popular street foods such as "Gobi Manchurian" and cotton candy. Authorities introduced stringent penalties, including imprisonment of up to seven years and fines of up to ₹10 lakh, for violators.
 - **Puducherry:** Introduced a ban on the sale of cotton candy containing Rhodamine B and directed food safety officers to enforce the regulation through regular inspections.
 - **Himachal Pradesh (May 2024):** Imposed a one-year ban on the production, sale, and storage of cotton candy after detecting Rhodamine B in samples, as a preventive measure to protect public health.

Expert Opinions on Rhodamine B

- **Oncologists' Perspective:**
 - According to Dr. Mohammed Mithi, synthetic dyes like Rhodamine B may break down into aromatic amines, which are known carcinogens.
 - Laboratory studies confirm that these dyes can cause DNA damage, oxidative stress, and promote tumor growth in animal models, though definitive evidence in humans remains limited.
- **Dermatologists' Views:**
 - Dr. Abyramy Balasundaram notes that synthetic dyes, when used within approved concentrations, are generally safe. However, unregulated use can cause allergic reactions, including itching, redness, and skin thickening.
 - Long-term exposure to dyes like Rhodamine B may lead to chronic skin allergies and pigmentation changes, even though the link to cancer in humans through topical application is not definitive.
- **Community Health Experts:**



- Priyadarshini Chidambaram highlights the weak research ecosystem in India regarding food dye safety. She calls for proactive funding and independent research to assess the impact of synthetic dyes on public health in the context of Indian dietary practices.

Challenges in India's Food Safety Ecosystem

- **Insufficient Research Infrastructure:** India lacks a strong framework for conducting independent studies on the health effects of food additives like Rhodamine B.
- **Weak Enforcement Mechanisms:** There is an urgent need for stricter enforcement of food safety regulations and penalties for violations.
- **Lack of Public Awareness:** Many consumers remain unaware of the health risks associated with unsafe food additives. This highlights the need for widespread public education campaigns, leveraging digital and social media platforms.

FSSAI Legislative Framework

- Highlights of the Food Safety and Standard Act, 2006
 - The Act aims to establish a single reference point for all matters relating to food safety and standards, by moving from multi-level, multi-departmental control to a single line of command.
 - The Act established **FSSAI and the State Food Safety Authorities** for each State.
- Highlights of Food Safety and Standards Rule, 2011. The Rules provides for:
 - The **Food Safety Appellate Tribunal** and the Registrar of the Appellate Tribunal, for adjudication of food safety cases.
- Highlights of Food Safety and Standards Regulations 2011
 - It covers Licensing and Registration, **Packaging and Labelling** of Food Businesses, Food Product Standards and **Food Additives** Regulation.
 - It prohibits and restricts on sales or approval for **Non-Specified Food and Food Ingredients**, such ingredients may cause harm to human health.
 - It provides for Food Safety and Standards on Organic Food and regulates **Food Advertising**.

Initiatives of FSSAI

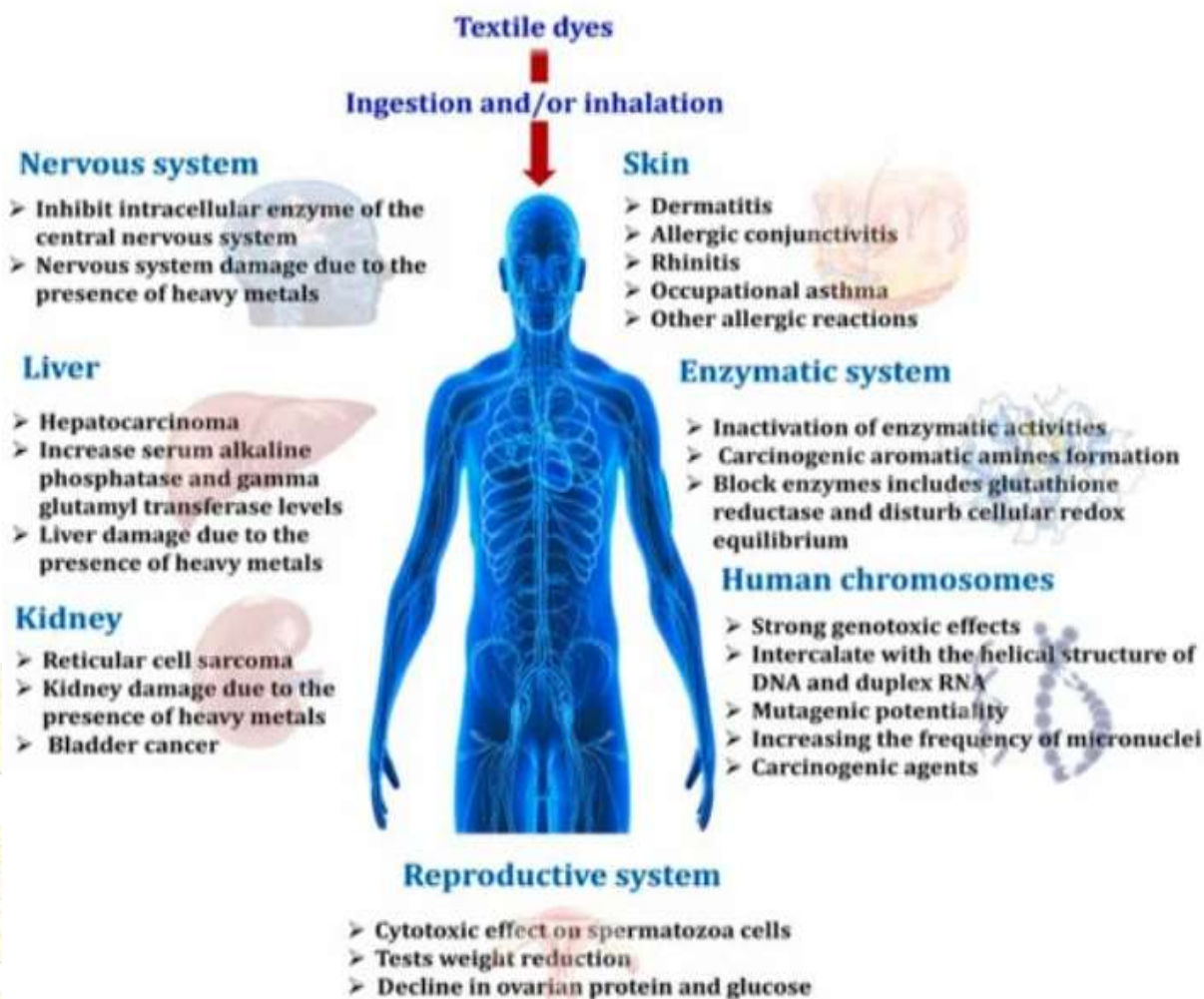
- **Heart Attack Rewind** – It is the first mass media campaign of FSSAI. It is aimed to support FSSAI's target of eliminating trans fat in India by the year 2022.



- **FSSAI-CHIFSS** – It is collaboration between FSSAI and CII-HUL Initiative on Food Safety Sciences to promote collaborations between Industry, Scientific Community, Academia for food safety.
- **State Food Safety Index (SFSI):** The FSSAI developed the **State Food Safety Index (SFSI) index** to measure the performance of states on five significant parameters of Food Safety.
 - The parameters include Human Resources and Institutional Data, Compliance, Food Testing – Infrastructure and Surveillance, Training & Capacity Building and Consumer Empowerment.
 - SFSI was started from 2018-19 with the aim of creating a competitive and positive change in the food safety ecosystem in the country.
 - The first State Food Safety Index for the year 2018-19 was announced on the first-ever **World Food Safety Day** on 7th June 2019.
- **Eat Right India Movement:** It is an initiative of the Government of India and FSSAI to transform the country's food system in order to ensure safe, healthy and sustainable food for all Indians.
 - It is aligned to the **National Health Policy 2017** with its focus on preventive and promotive healthcare and flagship programmes like **Ayushman Bharat, POSHAN Abhiyaan, Anemia Mukh Bharat** and **Swachh Bharat Mission**.
- **Eat Right Station Certification:** The certification is awarded by FSSAI to railway stations that set benchmarks (as per the **Food Safety and Standards Act, 2006**) in providing safe and wholesome food to passengers.

Importance of Food Safety and Public Health

- The case of Rhodamine B serves as a stark reminder of the hidden dangers in seemingly harmless products like candies and street foods.
- Medical experts emphasize that the health of a nation depends on the safety of its food supply, advocating for a shift in priorities toward long-term public well-being over short-term convenience or aesthetic appeal.



Concerns in India

- **Widespread Use:** Despite the ban, it continues to be used in food items, particularly sweets and sauces.
- **Health Threat:** Long-term consumption poses severe health risks, including cancer and organ damage.
- **Regulatory Gaps:** Inefficient monitoring and enforcement of food safety standards.

Conclusion

- The collective responsibility of governments, industries, and consumers is crucial in addressing the risks associated with synthetic dyes like Rhodamine B. Proactive measures, robust regulations, and widespread awareness are key to ensuring that the foods we consume are not only visually appealing but also safe for long-term health.

Source: <https://www.thehindu.com/sci-tech/health/the-hidden-dangers-of-rhodamine-b-a-global-and-local-perspective/article69131089.ece>