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Qualitative Analysis of Colour Additives and Adulterants in Festival Sweets

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ABSTRACT: In this study we have taken different popular sweets samples these are raw material, standard, substandard and loose sweets samples etc. which are mostly consumed by the common people during festive season which include khoya, sugar, Desi Ghee, Besan, Dry fruits, saffron, silver paper, Barffi, pedda, Besan loddos, kajju katli, Rabbdi, Rasgolla, Gulab Jamun etc. that are available in the local market of Aurangabad (M.S), which is chemically analysed for their colour additives and adulterants present in them. The chemical tests revealed presence of colour additives and adulterants such as starch in khoya and khoya products, chalk powder in sugar, Dalda in Desi ghee, starch in Basan, metanil yellow dye in saffron, coloured peanuts in pista, aluminium foil & plastic film in silver paper, starch in Barffi, Basan Loddos, Gulab Jamun and kaju katli respectively, bloating paper in Rabbdi, colours additives in Barffi and pedda. Hence, this study is to make society aware of addition of colour additives and adulterants in sweets (Mithai) during festive season.

KEYWORDS: food, material, additives, adulterants, trans fats, toxic, sweets.

I. INTRODUCTION

India is the country of festivals and sweets are the most important part of these celebrations. At the time of celebration sweets are gifted to loved ones in India but this sweet gift will turn to be poisonous due to the addition of colour additives and adulterants in them to make it attractive and to gain more money. The capitalists do not think they are destroying many lives for making of little money. Economic point of view is the most important factor responsible for food adulteration to make the large margin of profit. An adulteration in food is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing.¹



Fig a and b shows added different colours in Indian sweets and topping with the metal foil as silver foil, coloured dry fruits was added to make it colourful, attractive to the consumers.

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The added colour may cause brain damage, paralysis, some individuals can have allergic reactions to particular food colours and they are highly carcinogenic. Adulterants when consumed may cause anaemia, diarrhoea, stomach disorder, giddiness and damages digestive tract etc ^{2, 3}. The aim of present work is to make society aware of the addition of colour additives and adulterants in sweets (Mithai) available in the local market of Aurangabad (M.S) during festive season.

II. RELATED WORK

TOXIC MILK AND MILK PRODUCTS: The demand for sweets increases during festival season and there is so much shortage of milk in India, and this is felt even more during the festive season when demand for milk and by products such as Khoya and ghee sold more which further leads to increased adulteration. Milk based sweets are often found to be adulterated and contaminated with bloating paper and starch. This toxic substance can cause liver and kidney failures and much more damage.

TOXIC INDUSTRY DYES IN SWEETS : Research at the National Institute of Mental Health and Neuro Sciences, Bangalore, found that chronic exposure to metanil yellow causes neurotoxicity in rats.² A nationwide study has discovered that many of the colourings used in those sweets contain illegal and toxic dyes not for use in food.⁹ A team of scientists from Indian Institute of Toxicology Research, Lucknow, conducted a study on use of illegal colours in sweets. The team detected illegal and potentially toxic colours in around 16% of sweets. They also found that even with sweets that contained safe colours, 58% exceeded the cap of 100 mg/kg determined by the Food Safety and Standards Authority of India (FSSAI). They also found six banned dyes in the sweets tested: Rhodamine B, orange II, metanil yellow, malachite green, quinoline yellow and auramine. All these dyes are harmful in nature and causes diseases like cancer upon chronic consumption.

TRANSFATS USED IN SWEETS: All Indian sweets are prepared using vanaspati ghee or partially hydrogenated vegetable oils. These are trans fats and toxic. They cause a wide range of lifestyle diseases including hypertension, type diabetes, cancer and more.

FORMALIN USE AS PRESERVATIVES IN SWEETS: Many sweets factories in India use the chemical Formalin to preserve Indian sweets for long periods of time. Consuming formalin-mixed sweets can cause damage to kidneys and liver of humans and also cause asthma attacks and cancer. If pregnant women consume sweets mixed with Formalin there are high chances that the baby they deliver will be a physically challenged baby.

SILVER FOILED IN SWEETS: Indian sweets are traditionally covered by edible silver foil or 'chandi ka warkh' to make them attractive and beautiful. Tests conducted by the Food and Drug Administration (FDA), Pune, confirmed that the silver foil used for coating sweets is increasingly being adulterated with Aluminium. Aluminium is a hazardous metal when consumed. Aluminium accumulates in body tissues, especially the bones. It can also enter the brain. During pregnancy it can cause damage to the placenta and foetus.

III. METHODOLOGY AND DISCUSSION

The chemicals used for analysis were of A.R grade. All qualitative tests for identification of adulterants were done by using standard procedure in the laboratory. In this study we have taken different popular sweets samples these are raw material, standard, substandard and loose etc. which are mostly consumed by the people during festive season which include khoya, sugar, Desi Ghee, Besan, Dry fruits, saffron, silver paper, Barfi, pedda, Besan laddo, kajju katli, Rabdi, Gulab Jamun etc. that are available in the local market of Aurangabad (M.S), which is chemically analysed for their colour additives and adulterants present in them.

KHOYA: In loose-1, loose-2 by addition of iodine solution blue colour appears which indicates added starch in them. Starch destroys the essential nutrients from food in which they are added. High intake of starch can cause stomach disorders and digestive problems.

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SUGAR: Both samples substandard and loose shows effervescence when treated with dil HCL which indicates presence of chalk powder in them. Intake of chalk powder may cause stomach disorders.

BASAN (GRAM FLOUR): In standard, substandard samples were adulterated with corn starch as it show blue colouration when treated with iodine solution & loose sample were adulterated with tamarind seeds powder as it show pink colouration after addition of NaOH solution to them.

SAFFRON: They shows pink colour when treated with HCL which indicates they are adulterated with coloured tendrils of maize cob with metanil yellow dye. Intake of metanil yellow dye causes paralysis, brain damage, abortion and they are highly carcinogenic.

SILVER PAPER: when loose -1, loose-2 samples was burnt plastic film was found which indicates they are adulterated with the plastic film. All the samples when treated with conc. HNO_3 the silver foil does not dissolved which indicates presence of aluminium foil in them. Tests conducted by the Food and Drug Administration (FDA) India, confirmed that the silver foil used for coating sweets is increasingly being adulterated with Aluminium. It is a hazardous metal when consumed.

DESI GHEE: when conc.HCL and sugar were added in loose-1, loose- 2 ghee samples, crimson colour is observed that indicates they are adulterated with the Dalda (vanaspati ghee) or partially hydrogenated vegetable oils. Sweets are prepared using vanaspati ghee or partially hydrogenated vegetable oils. These are trans fats and toxic. They cause a wide range of lifestyle diseases including hypertension, type 2 diabetes, cancer and more.

DRY FRUITS: The topping of dry fruits on sweet sample -2 when treated with water gives green colour spots on filter paper which indicates they are adulterated with green colour to make artificial pista. Sample-1 and sample -2 was tasted they observed bitter in taste they indicates low quality dry fruits was used in topping. Added colour may cause paralysis, brain damage; some individuals can have allergic reactions to particular food colours.

RABDI: When they are treated with HCL and water after stirring with glass rod presence of fine particles of fibre on rod was observed which indicates presence of blotting paper in them as adulterant. Loose samples 2 & sample 3 when treat with the conc. Sulphuric Acid without shaking violet layer appears on the two junctions in the test tube which indicates addition of formalin as preservative in Rabdi.

BARFFI: Substandard samples and loose samples were adulterated with starch as it shows blue colouration when treated with iodine solution. Food colour was found in permitted limit. In sample 1 & loose -3 silver paper topping when treated with conc. HNO_3 the silver foil does not dissolved which indicates presence of aluminium foil in them. Sample -2 when burnt residue of plastic was found which indicates they are adulterated with the plastic film.

PEDDA: substandard samples and loose samples were adulterated with starch as it shows blue colouration when treated with iodine solution. Starch destroys the essential nutrients from food in which they are added. High intake of starch can cause stomach disorders and digestive problems.

BESAN LADDO: substandard samples and loose samples were adulterated with starch as it shows blue colouration when treated with iodine solution.

KAJU KATLLI: substandard samples and loose samples were adulterated with starch as it shows blue colouration when treated with iodine solution. In Samples-1 & sample-3, silver paper topping when treated with conc. HNO_3 the silver foil does not dissolved which indicates presence of aluminium foil in them. Sample -2 when burnt residue of plastic was found which indicates they are adulterated with the plastic film.

KHALAKHAN: loose -3 samples when treated with HCL and water after stirring with glass rod presence of fine particles of fibre on rod was observed which indicates presence of blotting paper in them as adulterant. Intake of blotting paper can cause stomach disorder and Damages the digestive tract. From all the samples silver paper topping was burnt residue of plastic was found which indicates they are adulterated with the plastic film.

GULAB JAMUN: substandard samples and loose samples were adulterated with starch as it shows blue colouration when treated with iodine solution. High intake of starch can cause stomach disorders and digestive problems.

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IV. EXPERIMENTAL RESULT

Table - The table content the detection tests and there observation for additives and adulterants present in festival sweets:

Sweet Samples	Samples tested	Observations for colour additives & adulterants	Additives and Adulterants Detected
Khoya	Loose-1 Loose-2 Loose-3	Found Found Found	Jute threads, starch Starch Starch
Sugar	Standard-1 Loose-2 Loose-3	Not found Found Found	----- Chalk powder Chalk powder, white stone
Basan	Standard -1 Sub standard -2 Loose-3	Not found Found Found	Jute threads found Maize starch Maize starch, tamarind seeds powder
Desi ghee	Standard-1 Loose-2 Loose-3	Not found Found Found	----- Dalda Dalda
Dry fruits	Loose-1 Sweet Toping sample-1 Sweet Toping sample-2	Found Found Found	Ground nuts, bitter nuts Coloured Ground nuts Bitter nuts,
Saffron	Standard -1 Loose-2 Sweet Toping-3	Not found Found Found	----- Maize cob coloured with metanil yellow dye Maize cob coloured with metanil yellow dye
Silver paper	Standard -1 Loose-2 Sweet Toping-3	Not found Found Found	----- Plastic foil Aluminium foil
Barffi	Standard-1 Substandard-2 Loose-3	Found Found Found	Aluminium foil, colour Starch, colour, Plastic foil, Bitter nuts, Starch, colour, Aluminium foil
Pedda	Standard-1 Substandard-2 Loose-3	Not found Found Found	----- Starch, colour Starch, colour
Besan loddus	Standard-1 Substandard-2 Loose-3	Not Found Found Found	----- Starch, Dalda. Starch, Dalda
Kajju katli	Standard-1 Loose-2 Loose-3	Found Found Found	Aluminium foil, Starch, Dalda, Plastic foil Starch Dalda, Aluminium foil.
Rabdi	Standard-1 Loose-2 Loose-3	Found Found Found	Starch, Aluminium foil, coloured groundnuts as dry fruits (pista) Blotting paper, Aluminium foil, formalin, Blotting paper, formalin

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Khalakhan	Standard-1 Substandard-2 Loose-3	Found Found Found	Aluminium foil, Biter nuts, Starch, Aluminium foil Maize cob coloured with metanil yellow dye as saffron, Starch, blotting paper, coloured groundnuts as dry fruits (pista)
Gulab Jamun	Standard- 1 Loose-2 Loose-3	Found Found Found	Starch, Starch, Dalda Starch, Dalda, colour

V. CONCLUSION

In this present work when Quantitative test was done, mostly all the loose samples were found to be adulterated when chemically tested in the lab. Colour additives were intentionally added for attraction of sweets. The edible covering or silver foil used for coating the sweets was made from Aluminium that can be harmful for health. Sweets were prepared using vanaspati ghee or partially hydrogenated vegetable oils. These are trans fats and toxic. It is better to make your favourite sweets at home rather buying sweets from stores. If you buy sweets from outside then make sure they do not have silver foil and do not use vanaspati ghee. Also never buy coloured sweets and buy only from brands where you can be sure that the milk is not adulterated.

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