

## STUDY OF CARCINOGENIC ELEMENTS IN TEXTILE FABRICS AND THEIR HARMFUL EFFECTS IN WESTERN INDIA.

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### ABSTRACT

**AIMS & OBJECTIVE:** The objective of this study was to analyze the presence of carcinogenic elements in fabrics and its harmful effects on human beings with the aim to develop a uniform and standardized policy in terms of safety for the health workers and users.

**METHOD:** The different types of fabrics were collected from the different textile industries of Gujarat and Rajasthan and were analyzed by standard techniques for the presence of heavy metals and prohibited amines.

**RESULT:** An analysis of the results obtained show that amount of heavy metals and prohibited amines present in fabrics and garments were exceeding the normal limits and was harmful to the workers, end users and to the environment.

**CONCLUSION:** Since the universal demand for safe fabrics and garments is increasing, the higher amount of carcinogenic agents like heavy metals, amines are absolutely unacceptable and manufacturers should improve their products to meet those growing demands.

**KEY-WORDS:** Carcinogenic, Fabrics, Heavy metals, Amines, Spectrometry.

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### INTRODUCTION

The incidences of carcinomas are increasing worldwide due to the chronic exposure to the various forms of carcinogens in routine life. Though the

ingestion and inhalation represent the principal route of exposure to carcinogens, but the skin absorption should not be underestimated.<sup>1</sup> Exposure to industrial workers and contamination of the environment in various forms is one of the

potential sources of carcinogens. Textiles industries are one of the major economic sources in India and they use various forms of chemicals in processing of fabrics which are potentially harmful to the workers and end users. These chemicals commonly involve different heavy metals and amines, which can be harmful to the human being and the environment in different ways.<sup>2</sup> These heavy metals produces unwanted effects and toxicity even if they are present in extremely minute quantities, on human and animal life.<sup>3</sup> The Indian government has published legislation<sup>4</sup> prohibiting the handling and use of the harmful and carcinogenic agents in processing and transportation of fabrics, but due to lack of strict laws and their implementation the present scenario is not good for human life and future. Hence, this study was undertaken with the aim to analyze the current situation regarding the presence of carcinogenic elements in textile fabrics and their harmful effects in the western part of India.

## MATERIAL AND METHOD

This prospective study was conducted at the Department of Forensic Medicine, AMC MET Medical College, Ahmedabad. The samples of fabrics were collected in glass bottles, which were previously cleaned by washing with non-ionic detergent and rinsed with deionized water and then soaked in 10% (w/v) nitric acid solution for 24 hours and finally rinsed with deionized water prior to use. Total 30 different types of printed, dyed cotton, polyester, and hosiery fabric samples were collected from the open clothes market as well as from the processing units of different textile industries of Gujarat and Rajasthan and

were preserved and transferred immediately to the Laboratory for the analysis. For heavy metal detection 20 samples of fabrics were analyzed by EDXRF, Atomic Absorption Spectrophotometer using IS/ISO 71-3:1995 method and for banned amines 10 samples of fabrics were analyzed by the High-Performance Liquid Chromatography (HPLC) machine using ICS 59040;71:40:50 method. All the samples were analyzed qualitatively as well as quantitatively for the presence of heavy metals and banned amines. The results were compared with the normal acceptable limits in India and the observations of other authors.



## RESULTS

The results of quantitative analysis for heavy metals of sample-1 and sample-2 are shown in Table-1 & 2 correspondingly

with standard deviations. The results are showing that there was a presence of toxic heavy metals including Ti, S, Ca, Fe, Cu Sc Nb in both samples, which were not in a safe range. Table-3 shows the results of the analysis for banned amines and we found that all the samples were showing the presence of different amines, which are banned in India and harmful to the human being and the environment.

**Table-1** Quantitative Analysis of Sample-1

Analyzed	Results	Std.Dev.
Ti	84.607	0.265
S	7.065	0.246
Ca	3.132	0.085
Fe	1.132	0.065
Cu	0.8120	0.037
Sc	0.151	0.032
Nb	0.094	0.00

**Table-2** Quantitative Analysis of Sample 2

Analyte	Result	Std. Dev
Si	30.208%	2.700
Ca	26.756	0.156
Ba	13.773	0.234
Fe	9.978	0.064
Ti	9.592	0.100
K	3.989	0.125
S	3.304	0.186
Cu	1.226	0.224
Zn	0.173	0.017

**Table-3** Results of Analysis for Banned Amines

Name of Amine	Concentration (ppm)
PCA	4.474
PCA	1.237
PCA	11.46
BDH	1.44
PAAB	2
ABP	10
BDH	1.6
PCA	5.52
PAAB	3.52
BDH	2.33

## DISCUSSION

Textile is one of the main industries in the developing countries like India. The process of different fabrics and garments utilizes a variety of chemicals depending on the nature of the raw material and product.<sup>5</sup> In the present study, we have analyzed the presence of heavy metals and banned amines in fabrics processed in various textile industries of Gujarat and Rajasthan and the results are showing that there was that there was a presence of toxic heavy metals and banned amines in samples of different fabrics, which are not safe to human being and the environment.<sup>6</sup>

The excessive use of heavy metals such as cadmium and lead, cadmium and chromium in various consumer products like electronics, toys, jewelry, packaging materials, food containers, etc. has an adverse effect on human health. The presence of different heavy metals in textile fabrics increase the absorption of harmful heavy metals through the skin and can cause mild to severe deleterious effects on human being in the form of anemia, proteinuria, glucosuria, osteomalacia, aminoaciduria, dermatitis, peripheral and central neuropathy, skin and respiratory cancers, encephalopathy and various other central nervous disorders.<sup>7</sup> In order to protect human health and reduce pollution of heavy metals to the environment, the international community has issued a series of safety standards to restrict and control the use of heavy metals in consumer products.<sup>8</sup> Sharma et al have studied the harmful effects of heavy metal contamination of soil and vegetables in suburban areas of Varanasi, India.<sup>9</sup>

In the present study, we have also analyzed for the presence of harmful amines in textile fabrics and we found that all samples were showing the presence of different amines, which are carcinogenic and banned in India. As per the Indian regulations, since 1993 the manufacturing, processing, storage, consumption and sale of Benzidine based dyes are banned and a corresponding ban was also enforced in 1997 on the use of Azodyes, which are carcinogenic when used in textile fabrics.<sup>10</sup> The use of Azo dyes in textile fibers release aromatic amines, which come into the direct and sustained contact with human skin and cause various health problems including cancers.

An analysis of the results in the present study, shows that carcinogenic elements are commonly used in textile fabrics and garments in objectionable amount, i.e. above the detection limit and are injurious to the public health and country's environment. With the improvement of people's living standard, consumers are becoming increasingly keen on green, non-toxic and environmentally friendly consumer goods. Since the global demand for safe and green garments is increasing, manufacturers shall improve product standards to meet those growing demands.

## CONCLUSION

The present study was undertaken to analyze the presence of heavy metals and banned amines in fabrics processed in various textile industries of Gujarat and Rajasthan with the aim to analyze the current scenario. In India there are no rigid laws & quality control available with reference to check on carcinogenic elements in the fabric and that's why textile manufacturers are not very much

concerned about this, especially in the garments, which are for sale in the local Indian Market. The use of heavy metals and banned amines in fabrics without any care and control is spoiling the environment and injurious to the public health in our country.

**Conflicts of Interest:** - Nil.

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