

Occupational cancers in leather tanning industries: A short review

Abstract

Work in leather tanning involves exposure to a wide range of chemicals. Some of these are carcinogens or suspected carcinogens. Increased risks for a number of cancers have been reported among the tannery workers. In the present review, a detailed account of lung cancer, testicular cancer, soft tissue sarcoma, pancreatic cancer, bladder cancer among tannery workers is mentioned.

Key words: Cancer, occupational exposure, tannery

INTRODUCTION

According to the International Agency for Research on Cancer (IARC), leather tanning and processing is not classifiable as to its carcinogenicity to humans, although the production process involves exposure to numerous chemicals, for some of which there is evidence of carcinogenicity in humans.^[1] However, in 1981, IARC had reported an increased risk for bladder cancer in the only study available at the time.^[2] Tannery workers have been known from previous studies to have the potential for exposure to numerous known or suspected occupational carcinogens including hexavalent chromium salts, arsenic, organic solvents (benzene, formaldehyde, butyl acetate, ethanol, acetaacetate, toluene and acetone). The two major sources of chromium particulates in the tannery work environment are chromium chemicals used in the tanning process in the form of Baychrom and $\text{Cr}(\text{OH})\text{SO}_4$. Chromium, which is a basic tanning agent, is available in trivalent form as chromium sulphate and in inorganic form and in the protein bound form that is known as leather dust. The leather dust produced by mechanical operations i.e., buffing and shaving, contains 3% of mostly protein bound chromium. The exposures within the leather tanning industry have been suggested by some investigators^[3-5] to result in the development of a variety of specific cancers including lung, bladder, kidney, pancreatic oral cavity, nasal and soft tissue sarcoma and skin along with dermatitis, ulcers, perforation of the nasal septum, respiratory illnesses.

Lung cancer: Epidemiologic studies of tanners have shown an increased risk for cancer of the lung.^[6-12] A review of cancer risk among tanners in Italy was published and indicated an excess of lung cancer.^[13] Increased mortality from lung cancer

has also been reported earlier.^[14] An excess of lung cancer was observed in a case control study in the US,^[6] but these results were not supported by other studies.^[10,15] Chromium and arsenicals were mentioned as possible contributors to the lung cancer excess. On the contrary,^[12] opined that the excess of lung cancer among tannery workers may partially be explained by cigarette smoking and not alone occupational exposure in the tannery industry as smoking is strongly correlated with cigarette smoking.^[16-17]

Pancreatic cancer: A three-fold statistically significant excess in pancreatic cancer mortality was noted in a Swedish case referent study,^[18] a 50% increase in pancreatic cancer was also noted in another study of three Swedish tannery industries^[9-10] and in an Italian tannery.^[9] Despite the excess risk of pancreatic cancer, no specific environmental agent was identified and dietary factors were considered as a possibility. Pancreatic cancer was not found to be elevated in the earlier report.^[12] High mortality of pancreatic cancer in women due to chromium compounds was reported earlier.^[19] These women were employed in the dyeing, stuffing and decorative process where they were basically exposed to organic solvents, formaldehyde, aniline and azo dyes. Similar findings have also been reported^[14] who reported that the majority of the workers who died of pancreatic cancer had high exposure to formaldehyde and high dye and solvent exposure. High mortality form of pancreatic cancer is also shown in earlier studies^[15,20,21] showed the strong ability of proteins of leather dust to bind inorganic Cr III compound and facilitate their

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entrance into gastro intestinal tract.

Skin cancer and melanoma: One study in USSR showed skin carcinogenic effect of some synthetic fats used under leather stuffing.^[22] The workers exposed to leather dyes and fats may initiate skin cancer by direct impact. Moreover some organic solvents, acid mediums and fats deeply injure the skin. The females working in the dyeing, stuffing and decorating processes suffered from melanoma of skin and nonmelanoma skin cancer. High mortality of melanoma and skin cancers in females occupied in dyeing, stuffing and decorative workshops was observed in a recent study.^[19]

Kidney Cancer: An excess of kidney cancer among tannery workers has been suggested by an earlier report.^[9] The dyes and pigments were mentioned as possible causative factors.

Buccal cavity and Pharynx cancers: The workers in the tanning and liming workshops where exposure of leather dust was not high suffered from buccal cavity and pharynx cancers.^[23]

Pancreatic cancer: Majority of workers who died with pancreatic cancer were either driers (high formaldehyde exposure) or painters (high dye-Direct Black 3 azo dye and solvents).^[23] In these conditions they presumed that azo dyes and/or formaldehyde could initiate DNA mutation and chromium III promote pancreatic cancer growth. However, many studies^[24-26] noted strong association between pancreatic cancer and smoking.

Bladder cancer: The analysis of recent literature data mainly based on case control studies^[25,26] showed the prevalence of bladder cancer in the leather industry. But only a few cohort studies^[5] found the similar significant results. Aromatic amines and benzene-based dyes were suspected as possible carcinogens. Recent reports^[23] show one case of bladder cancer in man who was occupied in tanning and liming workshop. They pointed out gender difference in the prevalence of bladder cancer as women had much lower risk to develop bladder cancer than males.

A study of the Chinese leather tanning industry showed a statistical significance excess morbidity from bladder cancer among tanners were exposed to benzidine-based dyes, which increased with duration of exposure.^[26] A similar result was reported^[27] in her study of Tuscan tannery industry and in her review of other studies among workers in Leather finishing operation.^[9] However, earlier report suggest that in his mortality study bladder cancer risk was not elevated.^[12]

Sinonasal cancer: An excess risk of sinonasal cancer among leather tannery workers was observed in a case control study in Italy.^[28,29] Chromim, leather dust and tannins were indicated

as possible etiologic agents. One case of nasal cancer was also reported earlier.^[30] However, IARC reported that there was no evidence of an increased risk of nasal cancer in the Leather tanning and processing industry.

Testicular cancer: An excess risk of testicular cancer incidence was observed among leather tanners from the finishing department of the tannery and were exposed to dimethylformamide (DMF), a substance known to cause testicular damage.^[34,32] A statistically significant odds ratio of 7.2 for testicular cancer was observed among leather tanners.^[34,33] DMF was suggested as a possible cause of the excess risk of testicular cancer. This was supported presence of DMF in the air samples at the work place.

Soft tissue sarcoma: Two separate tannery studies indicated a significantly increased risk of this rare cancer. Both investigators suggested that chlorophenols used in the pretanning operation and in the tanning process which have produced these tumors.^[10] Similar findings have been reported earlier.^[47]

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