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Probing the Paint: An Examination of Particle Deposition on Soft Contact Lenses On the Eyes

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Abstract

Introduction: The growth of construction is a crucial aspect of urbanization as it leads to deterioration in air quality. However, it offers employment with multiple activities, namely concreting, welding and painting. Painting in construction involves exposure to heavy metals, VOCs, dust, and fumes. Numerous physiological problems, including fatigue, nausea, headaches, breathing problems, probably bronchitis and asthma, as well as psychological problems, such as stress and anxiety when breathing. There are numerous studies on the effects of skin, hair, lungs, heart, and respiratory tract on health. However, less attention is paid to the effects of air pollution on eye health, particularly when painting. This study would increase the importance of considering the health effects on painters' eyes when painting, followed by the physiological negative effects.

Material and Methods: One phase of the soft contact lens investigation is tracking the accumulation of particles on the painter's eye surface in an old building in Salem, Tamil Nadu. Additional processes involve several chemical tests carried out while the painting is being done, followed by a questionnaire and a diagnostic of the health effects of the painting. In chemical analysis, morphology is analyzed using SEM, the organic content of the materials is ascertained using FTIR, and the inorganic or elemental features are identified using ICP-MS.

Results: The SEM results show that the particles are irregularly shaped, fibrous, and crystalline, and looked like threads and knots with the appearance of spray salts. The FTIR shows the existence of probable bonds: N-H, OH, CH, C-C, C=C, C=O, C-N, C-O-C, C-Cl, C-Br. The ICP-MS results showed the presence of 26 elements. Although elements such as mercury, lead and titanium are present in trace amounts, this can cause an existential crisis for human lives.

Conclusion: The concentration of the particles may have a little dilution impact, but the particle abundance would remain unchanged despite the absence of a blinking mechanism in the sample that was obtained. According to the SEM data, the particles have sizes ranging from 38.09 to 48.76 nm. The three main components in the mix were aluminum (946.099 µg/m3), magnesium (1092.937 µg/m3), and calcium (2130.73 µg/m3). According to the questionnaire survey results, the painters experience frequent eye discomfort, inflammation (titanium), cataract(magnesium), redness (Calcium), and tears (titanium).