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Respirable crystalline silica (RCS) and feldspar particles airborne and respired by equines in riding arenas: could it be a non-conventional exposure for humans?

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Soils used in equine riding arenas, commonly described as riding surfaces, are a mixture composed by several specific natural sandy rock frequently enriched of organic additives. The most common and abundant minerals composing these soils are quartz and feldspars, but some types of phyllosilicates are also present.

Respirable crystalline silica (RCS), i.e. < 4 μm quartz grains and/or other silica polymorphs, are classified as carcinogens. A few studies have been carried out on the potential toxicity of feldspars, but some authors have recently stated that respirable grains of these minerals "may induce cytotoxicity and acute pro-inflammatory responses to a similar or greater extent than quartz" and also that other mineral particles like muscovite may be associated with toxicity and pro-inflammatory effects (1).

Therefore the presence of quartz and feldspars in equine riding surfaces could be a risk factor for the health problems in humans working closely with these animals because mineral particles result from the continuous crushing of the soil and consequent air dispersion of dust caused by the trampling of horses during work in the field.. Since horses themselves can suffer from pneumoconiosis, they can play the role of sentinel animals. Moreover, the hypothesis that horse riding represents an unconventional occupational exposure to RCS and feldspars is likely.

The present study deals with an investigation of minerals and inorganic particles present in soils and air in equine riding arenas, and in equine bronchoalveolar lavage (BAL) samples. The used techniques, depending on the kind of samples, are: SEM-EDXS, TEM-EDXS, XRPD, and cytopathological analysis.

The result highlights the abundant presence of RCS and feldspars, as well as muscovite and other phyllosilicates are widely present.

The present study provides a way to characterize the exposure of horses to RCS and feldspars and highlights the problem relating to a potential increased exposure risk for humans, both equestrian workers and people frequenting riding arenas.

In this dynamic context, the hypothesis that horses can be used as a sentinel for human health by a periodic control of the BAL inorganic particles burden deserves further attention.

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