



Geological Control of High Fluoride Concentrations in Drinking Water and its Health Impacts: A Case Study From the District Swabi, Khyber Pakhtunkhwa Pakistan

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Fluoride (F) contamination in drinking water derived from groundwater sources has been recognised as one of the health hazards globally (Fawell et al., 2006; Shan et al., 2013; Elango and Jagadeshan, 2018). Exposure to fluoride contaminated water is responsible for serious health issues such as fluorosis. In the district Swabi of the Khyber Pakhtunkhwa province, Pakistan, exposed F- bearing granitic rocks might pose F contamination to the drinking water in the surrounding area, hence impacts on health of the population.

The purpose of our study is to determine the fluoride concentrations along with the physico-chemical parameters (Conductivity, pH, TDS, NO₂, NO₃, SO₄, Cl, HCO₃) in the drinking water samples in district Swabi of the Khyber Pakhtunkhwa province and its possible health impacts on the population living in this district.

Preliminary results indicate that 83% of the drinking water samples have fluoride concentration ranging between 1.5 and 15 mg/L which are above permissible limits of WHO (1.5 mg/L) and USEPA (2 - 4 mg/L). However, all other physico-chemical parameters are within the permissible limits. The high fluoride prone areas are located in close vicinity of granitic rocks in the region. Inverse relationship is found with increasing distance from the granitic complex. It is concluded that the main sources of contamination in the study area are confirmed to be geogenic e.g. alkaline rocks of the Ambela granitic complex in our study area.

Regarding health issues noticed in some areas of the district, about 90 % of the population from Naranji, Sher Dara and Palosai are suffering from dental and skeletal fluorosis, which are clear indications of the impacts of exposure to high fluoride concentration in drinking water of these areas.

Key words: fluoride, groundwater, WHO, USEPA, fluorosis, granitic complex, Pakistan