Assessment of drinking water quality of Drosh and Asheriat district Chitral Pakistan

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Abstract

Current study has been conducted to investigate the water quality of Drosh and Asheriat district Chitral. In study area exposed lithologies (mafic and ultramafic rocks) and their mineral content may affect the surface and ground water through leaching and weathering. About 65 water samples were collected from different water sources (springs, rivers, streams, tube wells) from Drosh and Asheriat. All the samples were analyzed for physico-chemical parameters using standard methods. Total and fecal coliform analysis were carried out for fifteen samples by using multiple tube fermentation technique for water and wastewater. The concentration of heavy and trace elements were determined using Perkin Elmer Atomic Absorption Spectrometer (AAS-700).

The results of physico-chemical analysis showed that the concentration of pH, Temp, EC, TDS, Salinity, Chloride, Nitrate, Sulfate, Phosphate, TSS in Drosh and Asheriat were found within permissible limit as suggested by WHO 2004 and USEPA 2009. However turbidity was found above permissible limit in 66% from Drosh area and 78% from Asheriat. Results of heavy metals from Drosh indicated that the concentration of Ni, Pb, Cd, Co, Cr, Cu, Zn, Mn, Fe were having mean values (ppb) 7.97, 0.73, 0.23, 0.06, 4.04, 79.01, 210.6, 2.72, 8.48 respectively. The concentration of light elements such as Na, K, Ca, Mg were having mean values (ppm) 20.44, 8.01, 104.67, 36.7. The mean concentration (ppb) of Ni, Pb, Cd, Co, Cr, Cu, Zn, Mn, Fe from Asheriat area is 16.92, 0.96, 0.29, 0.05, 5.05, 100.04, 266.7, 3.41, 10.67. While the mean concentration (ppm) of Na, K, Ca, Mg is 17.95, 8.42, 94.7, 17.96. The results of total and fecal coliform analysis showed that maximum probability number (MPN/100ml) in fifteen samples ranges from 0-1800. Majority of the heavy metals in all samples are below permissible limits as suggested by WHO and USEPA. However Ni was found above the permissible limit in 8% from Drosh and 7% from Asheriat and Ca were found above permissible limit in 75% from Drosh and 71% Asheriat area. Mg was found above permissible limit in 8% samples from Drosh area. The excessive intake of heavy metals can cause toxicity and also effect human health. For instance Ni can cause lung and nasal cancer, Mg can cause hypertension and cardiovascular diseases Ca can cause nephrolithiasis and colorectal cancer. Microbial contamination (E.coli) can cause water borne diseses such as diarrhea, gastroenteristis and typhoid.

On the basis of all these results, it is concluded that drinking water of both Drosh and Asheriat are contaminated with Ni, Ca, Mg and fecal coliform. Therefore monitoring of drinking water in the study area should be performed regularly. Boiling is recommended to reduce the level of contamination in drinking water. The strong association of Ni, Ca and Mg in drinking water of the study area is indicative of geogenic contamination.