Abstract

Recently, global concern has been raised to investigate the ecological system, were pharmaceutical pollutants affect negatively on aquatic life and underground water, researchers investigated main causes of its environmental impacts. Many Pharmaceutical compounds has been detected in wastewater samples in many areas. In Palestine, were wadi Al-Qilt catchment area has been affected by many pharmaceuticals. Upon that, this study investigated the occurrence of main pharmaceuticals in Al Qilt catchment area that affected underground water, in addition of reviewing information on sorption and transformation of three main pharmaceuticals, in addition to assessing the risks of these pharmaceuticals on public health. HPLC MS/MS analysis has been used to investigate the presence of these pharmaceuticals.

The Al-Qilt catchment is located in the West Bank on the western side of the Jordan Valley covering about 173 km^2; it is characterized by a steep relief with elevations in the range of 700 m.a.s.l in the western part to the range of -250 m.b.s.l in the eastern part. At Al-Qilt, there are about 96,935 inhabitants from Palestinian communities and Israeli colonies, they discharge about 14,000 m^3/d of wastewater and only about 30% of these quantities is treated, then it is mixed again with raw wastewater. Moreover, at Al-Qilt the rainfall is estimated by 600 mm/a in the west and it is 150 mm/a in the east area, which resulted of an average rainfall over the catchment is 400 mm/a. The long term observations of flow mainly for Al-Qilt springs range from 3.0 to 12.0 Mcm/a, and the continuous base flow for the Ras Al-Qilt spring of around 300 l/s (PWA, 2009).

In this study, sixteen pharmaceuticals were analyzed using HPLC method, namely: Phenacetin, Indomethacin, Diclofinac, Ibuprofen, Fenoprofen, Ketoprofen, Gemfibrozil, Fenofibrat, Fenofibrinsaure, Bezafibrat, Clofibrinsäure, Carbamazepin, Pentoxifyllin, Naproxen, Diazepam, Etofibrat. From all of those pharmaceuticals, only Ibuprofen, Diclofinac and Carbamazepne were detected in a considered concentrations, while the others were nil. These compounds are examples of pharmaceuticals that are released into the environment, all are marketed in the Palestinian market (pharmacies), private clinics, hospitals either for human veterinary use. Ibuprofen was detected only in the AWWTP inffluent in the first and second sampling time with a concentration of 300 ng/L and 1000 ng/L respectively and then disappeared in the other sampling stations because it was

eliminated after AWWTP. Diclofinac was detected in AWWTP influent in the two sampling time with a concentration of 310 ng/L in the first sampling time and 1450ng/L in the second sampling time. This concentration was decreased after treatment to 50ng/L and 225ng/L respectively. Then it was disappeared in Ras Al-Qilt and in Al Murashahat. On the other hand, Carbamazepine was detected in AWWTP influent with a concentration of 1995 ng/L in the first sampling time and then decreased respectively to become 1750 ng/L in AWWTP effluent, 1550 ng/L in wadi Mukhmas, 64 ng/L in Ras Al Quilt to reach a value lower than background in al Murashahat influent and effluent . The results revealed that the concentration of diclofinac and ibuprofen were below the background then there have no risk on al qilt catchment area, but the concentration of the carbamazepine in the second sampling time in Al Murashat influent and effluent was 48ng\L and 44ng\L respectively and this concentration was very low and near the background, then we can conclude that there are no risk of carbamazepine on drinking water in Al Murashahat station.