Nitrate As A Factor For Water Pollutant And Related Diseases: A Case Study In Kashafroud River (Northeast of Iran)

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Abstract

Water quality is an important factor for human health. Nowadays, special rules have been considered in order to improving water quality. Kashafroud River watershed is located in Khorassan Razavi province (Northeast of Iran). This river emanates from Hezar Masjid and Binaloud Mountains pass through out Mashhad plain, enters to Turkmenistan and joins to the Harirroud River. Biological and chemical analyses of Kashfroud River water shows amount of Nitrate have been increased along the towns and villages. Considerably this amount of Nitrate is more than the standards. Studies show human, industrial and agriculture waste water cause physical, chemical and biological pollutions and as a result increase amount of Nitrate in water. Famous disease that is known for high density of nitrate in drinkable water is Methaemoglobinemia and Cyanosis.

Keywords: *Kashafroud River, Water Pollution, Waste Water, Nitrate, Diseases, Methaemoglobinemia, Cyanosis.*

Introduction

According to the environmental rules and related subjects, considering water quality is as an important. Surface water pollution is a global problem (sharma and Al-Busaidi, 2001; Smith, 2001; Jones, 1993). Polluted water has basic role in terms of human health because it causes variety of diseases. These kinds of diseases are produced by bacteria, virus, protozoa and worms. Water sources like rivers, channels, lakes and dams particular in tropical areas are suitable places to spread this kind of diseases. These sources provide suitable environments for sponges host like mollusks, fishes, aquatic plant and diseases porter like gnat and other piquant insect. In general, global water pollution which causes the diseases is related to human urine and stool pollution. Some diseases that origins from pollution are cholera, typhoid, paratyphoid, hepatitis and microbus squirt. This kind of diseases presented on the people who use same polluted water source. Other human diseases related to water transmitted through sea or washing water are organic and chemical diseases. Chemical pollution involves: plumb, nitrate, florid, arsenic and water hardener.

Kashafroud Drainage Basin

Kashafroud River watershed is located in Khorassan Razavi province (Northeast of Iran). This river emanates from Heazr Masjed and Binaloud Mountains pass from Mashhad plain and flow to the east of Iran. It enters to the Turkmenistan and joins to the Harirroud River

(285 Km length). Kashfroud River drainage basin is located in Kopet Dagh, Binaloud and Central Iran Zones. This zone has a special morphology. Small part of this basin locates in Central Iran zone. Kopet Dagh basin has young morphology and its topography directly refer to geological structures. According to same effects of geological and erosion factors, carbonate formations like Mozdouran Formation are the hard rock units of Kopet Dagh and formations like Sanganeh Formation are soft rock units that formed mountains and valley. Binaloud zone is surrounded by Touran and Central Iran plates. This zone includes some part of Alborz Mountains and has special geological properties.

Kashafroud River Pollution

One of the main reasons lead Kashafroud River water pollution is wastewater of villages and Mashhad city where are near the Kashfroud River. This waste water is emptied after filtration but unfortunately this refinery do not operate well; therefore, it is polluted the river. Entry of industrial waste water is another reason for water pollution. This kind of waste water empty to this river illegally. Industrial waste water includes heavy metals that producing by mining activities without considering to environmental impacts and as a result increasing suspended materials like minerals, decreasing of water quality. Besides, agriculture wastes water: poisons, dung and fertilizers are another parameter in water pollution (Dehghan et al., 2009).

Nitrate

Nitrate is one of the main parameters of drinkable and agriculture water quality. (Krapac et al., 2002; Criss and Davisson, 2004). Nitrate enters to the surface and ground water because of disintegrate human and animal waste, industrial productions and agriculture pollutions (Di and Cameron; Kraft and Stites, 2003). Nitrogen in the form of nitrate in high density is completely harmful and threat human health. Famous disease that is known for high density of nitrate in drinkable water is Methaemoglobinemia and Cyanosis for children (Avery, 1999; Kladivko et al., 2004). Methaemoglobinemia create because of iron molecule oxidation in form of ferric. This leads brown and blue color in skin. Methaemoglobinemia has a high affect to oxygen. This subject stops sending oxygen to body tissue. Levels more than 50 – 60 percent is too dangerous. Methaemoglobinemia in level of 15 percent almost show cerebral ischemia symptom. Amounts of more than 60 percent lead to death. Vein injection of Methelyne Blue is effective urgent treatment of Methaemoglobinemia (Harrisson, 2005).

Also studies show increasing risk of cancer from water pollutions (cyst and lymphatic cancer) (Weyer et al., 2001). Animal may suffer from disease like Methaemoglobinemia, lack of A vitamin and abortion because of high density of nitrate in water (Fewtrell, 2004; Knobeloch et al., 2000).

High density of nitrate in water leads growth of aquatic plants. Thus planktons had growth in a large amount and it is really dangerous for animals and plants that live in aquatic environments (Dorgham et al., 2004; Lucassen et al., 2004). High amount of weedy grass decrease oxygen and increase growth of alga. Also the amount of produced toxin leads to decrease water quality (Gheysari et al., 2007).

Permissive amount of nitrate density in irrigation water determined by Environmental Organization of USA 45 mgr/lit (US-EPA, 1996) . Also permissive amount of nitrate for

surface water is 50 mgr/lit and for the absorbent shaft is 10 mgr/lit that is reported by Environmental Organization of Iran (Environmental Organization of Iran, 1994).

Nitrate in Kashafroud River

Biological and chemical analyses of Kashfroud River in five point show, amount of nitrate have been increased along the towns and villages (Table. 1). This amount in two last points is more than permissive amount of nitrate that is acceptable by standard organization.

Using high amount of Nitrogen compound in agriculture leads increasing nitrate density in upper layers of soil. During the time, washing operation leads to movement of nitrate due to the lower layers of soil and enter to the ground waters. Also, because of low raining, decreasing of ground water level leads increasing of nitrate density. Of course some amount of nitrate enters to the rivers through surface flow and leads to pollution.

Kinds of waste water which flow to the Kashfroud River leads to its water pollution, specially increasing amounts of nitrate.

Conclusion

According to usage of Kashfroud River water in order to drinking, agriculture, fish producing along this river and also the diseases like Methaemoglobinemia and Cyanosis that resulted from nitrate pollution, using this water needs more investigations and consideration in terms of human health. Finally, finding suitable way for water filtration is required.

Table.1: Kashafroud River Water Analysis (NO_3^-)

No.	NO_3^- (mgr/lit)
1	3.80
2	6.60
3	12.60
4*	69.00
5*	89.00

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