Original Article

Comparing Chemical Composition And Mineral Content Of Zamzam Water With Tap Water And Well Water Kurdistan Region

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Abstract

Many Muslims drink Zamzam water for medicinal or religious use. Millions of pilgrims drink it and take bottles of it to their countries of origin. There are not enough scientific studies on Zamzam water. This study will provide basic information about some of the elements content of Zamzam water and the use of modern laboratories and equipment. The data will help us understand the sources of pollution under discussion and the reactions at the local and international levels and will shed light on the potential healing power of Zamzam water. The authors are interested in researching and studying more deeply about Zamzam water based on the hadith of the Prophet Muhammad and science. Some samples of tap water and Zamzam water, as well as one sample from the tap, were analyzed according to standard methods (APHA) for their chemical components (TDS, Mg, Fe, Cu, Zn, Pb, Cr, Ni). The results were compared with WHO and EPA guidelines for drinking water quality. All parameters analyzed were below the maximum permissible limits (MAL) of WHO and EPA ($p>0.05$), except for TDS. The average TDS values (669 mg L in Zamzam water and 340 mg L in tap water and 820 mg L in well water) were lower than the WHO MAL (1000 mg L-1) but exceeded the Agency for Protection limit Environment (500 mg L-1) ($p < 0.05$) We conclude from these results that Zamzam water has no sign of pollution and is non-toxic.

Keywords: Zamzam water, tap water ,well water ,mineral, Kurdistan region.

Introduction

Water is one of the main nutritional components whose quality plays an important role for food safety and the health of living beings. Groundwater provides excellent water sources that are free from microbiological contamination (Rudzka – Kantoch (2000). According to Arab historians, the well of Zamzam was used about 4000 years ago. It represents The well is the site of an eye, in which God, in his mercy, sent the angel Gabriel, who scraped the earth, and the spring appeared, and that was with Hajar. The wife of the Prophet Ibrahim and their infant son Ismail (peace be upon him) were desperate to search for water, which was dying of thirst.. When the spring was found, and for fear that it might run out. Water, Hagar surrounded it with sand and stone. The word Zamzam is derived from the Arabic language, "meaning the abundance of water. Zamzam was called in its meaning, because the water of the well is abundant and abundant. Zamzam has been described in the holy books of various religions, including the Torah / Torah, the Bible, and the Qur'an, as it was mentioned. In these scriptures, Zamzam is holy water and is described as a great gift from God.It is claimed to be a branch of the holy spring in the arid desert surrounding Mecca.The well of Zamzam is located inside the Grand Mosque about 20 CE east of the Kaaba in Mecca.The source of Zamzam water is located in an area Mecca, which is one of the holiest

cities for Muslims. This city is located in the western part of Saudi Arabia, 70 km south of Jeddah on the Red Sea coast. Geographically it can be located at latitudes 21°26`48`N, and longitude 39°53`46``E, with an elevation of about 1,399 feet, above mean sea level. The depth of the Zamzam well is about 30.5 m and its diameter ranges from 1.08 to 2.66 m. The well is now located on the ground floor enclosed in panes of glass allowing a clear view of the interior. Water is drawn by electric pumps to be available in taps distributed in specific areas in the mosque (Khalid et al., 2014). In 1971, the Ministry of Agriculture and Water Resources of Saudi Arabia sent samples of Aabe- Zamzam for examinations in European laboratories to test the drinkability of Zamzam water. The results of water samples tested by European laboratories showed that Zamzam water has a special structure that makes it useful for water. The main difference between Zamzam water and other water (city water) was in the amount of calcium and magnesium salts, and their content was slightly higher in Zamzam water, but most importantly, the water contains fluoride, which contains an effective bactericide. Moreover, European laboratories statements showed that the water was drinkable (Analytical report,1971). Zamzam water was also proven to contain high levels of fluoride, magnesium, calcium, chloride, sulfates, nitrates, nitrates, TDS and alkalinity when compared to tap water and drinking water. Zamzam water, well water, tap water and drinking water, there is no indication of biological growth (Alshikh, 2013) Zamzam water differs from other water in several ways, firstly, bacteria cannot form or grow from its source.Second, it does not rot and does not change color, taste or Odor (Koshak, 1983) Biologically, growth and vegetation usually occur most of the time for well water.This makes the water unpalatable due to algae growth which leads to changes in taste and smell, but in Zamzam water well there is no biological growth (Mashat, 2010) Zamzam water is a potential protective agent against diabetes, hepatotoxicity and nephrotoxicity due to its antioxidant capacity (Abd-Azeem et al., 2017). Zamzam water may play a crucial role in its effectiveness in inhibiting calcium oxalate formation. Drinking Zamzam water reduces the formation of kidney stones because it is rich in many minerals (Abd-Khalek et al., 2013). People consume different types of water, including tap water (from sea, rivers or groundwater) and bottled water, with the consumption of bottled water increasing in the past decades (Alfadul and Khan, 2011). On bottled water from sea and ground water. Bottled drinking water must be treated and minerals added to meet drinking water quality standards, while bottled natural mineral water can be bottled directly from natural underground sources that provide drinking water quality water (GCC Standardization Organization, 2019). Where drinking water quality standards have been determined by organizations such as the World Health Organization (WHO) and the Gulf Cooperation Council (GSO) Standardization Organization (GSO) by referring to the reference values of different water components (World Health Organization, 2006. Zamzam water has acceptable chemical properties However, more studies are needed apart from the bias that may influence the study of such a religious and spiritual topic.In 1976, the American Water Resources Association published the first of an international article on the chemical composition of Zamzam water, and other studies were also conducted on the subject, and the results were Inconsistent, especially with regard to arsenic (Al-Barakah, et al., 2017), (Shomar et al., 2012). Studies on the chemical composition are conflicting. Zamzam water is especially for arsenic, so there may be other factors that also affect the results of Zamzam water studies, and this diversity includes the destinations of Zamzam water, various methods of examination, and enormous cultural activities around the well.Therefore, our study aims to be the most accurate way to explore the nature of Zamzam water is a study The composition of tap water and well water In Sulaymaniyah Governorate, Kurdistan Region of Iraq, Zamzam bottled water and its quality comparison according to the international guidelines for drinking water.

Material and Method

Laboratory tests were conducted to analyze the chemical composition of drinking water in the city of Sulaymaniyah in the Kurdistan Region of Iraq and compare it with Zamzam water. Water samples from both sources. As for tap water and well water, it was collected during the day. Tap water and well water were allowed to flow for a few minutes before sample acquisition. The bottle was first washed three times with water before about 300 ml of the water sample was collected in a 500 ml polythene bottle. Zamzam water was collected from the markets and obtained from pilgrims to the House of God. Each set was about 300ml by 500ml in polythene bottles. Analysis was performed within 24 hours. Total

dissolved solids (TDS) concentrations were measured using a TDS meter. The analysis was (Ni Cr Cu Pb Fe zn mg), which was examined by a device ICPE-9000 was determined from Japanese Shimadzc which was used to evaluate mineral content in pine water, well water and Zamzam water. The design of the experiments was a complete factorial random design (CRD) to determine the difference between tap water, well water and Zamzam water. The analysis is performed with XLstat (2016) according to this equation: Yijk = μ + Ai + + Bj + AB (ij) + eijk where Yijk = dependent variable, μ = overall mean, Ai = effect of application of Se and Zn factor, Bj: effect Age factor, ABij = effect of interactions between two factors, eijk = standard error, mean compared to Dunken (1955) within the programme.

Results and Discussion

There are different types of drinking water available in the Kurdistan Region of Iraq. Tap water, spring water, bottled and mineral water. Well water, as bottled water was gaining more popularity (Paul et al., 1998). Summary of the results obtained in this study, where the results of Table No. (1) showed that the average values of dissolved solids (669 mg L in Zamzam water samples and 340 mg L in tap water sample and 820 mg / L in well water) were less than the private MAL WHO (1000 mg L-1) but exceeded the EPA limit (500 mg L-1) ($p < 0.05$). The samples exceeded the optimum value more than the maximum value allowed for the total dissolved solids in the well water. The maximum allowable value for USEPA standards is 500 mg / l. Total dissolved solids varies from one site to another and from well to well. The most important of all of them is the source of Zamzam water, that it be a reliable or commercial source. This is what indicates the different types of soil and rocks that the groundwater passes through. Total dissolved solids and total alkalinity in all wells especially exceeded the maximum allowable value within the limits of SAS and USEPA, which makes Drinking is impossible before removal of excess total dissolved solids and total alkalinity or dilution with water that has low TDS and total alkaline concentrations. It was found that zamzam water has a therapeutic effect alkaline in nature, zamzam water can neutralize the excess hydrochloric acid is formed in the stomach and reduce heartburn (Kellas et al. 1996) (Careem, 2005). According to the geographical regions the concentration of TDS may vary, indicating that the samples taken from the well water had advanced and the TDS concentration was higher than that of Zamzam water and tap water in the Sulaymaniyah region of the Kurdistan Region of Iraq, which is not necessarily harmful according to the French Food Safety (French Food Safety Agency ,2008). There is a dearth of information about the health impact of TDS but according to the World Health Organization (2008), high levels may affect consumer acceptance. However, French guidelines for TDS concentration recommend different mineral water contents than WHO and GSO (French Food Safety Agency, 2008), However there are no fixed reference limits for TDS concentration, and French guidelines indicate mineral content classification as very low, low and rich for stable residues below 50 mg L-1, less than 500 mg L-1, and above 1500 mg L-1 at 180 ° C, respectively. Fixed residues and TDS.

Table 1. Give the summary of the results obtained in this study for total dissolved solids (TDS).

NO	T.D.S	R	SA
Zamzam water	669	1494	0.3
Tab water	340	2940	0.1

Well water	820	1223	0.3

Means with different letters within each column differ significantly (P≤0.05) according to Duncan's test.

Table 2 showed that the results were significant for the magnesium concentration in Zamzam water, which was the highest level compared to tap water and well water. While the concentration of zinc, iron and chromium showed the highest level in well water compared to Zamzam water and tap water, and there were no significant differences for the level of copper and lead in Zamzam water, tap water and well water. The level of nickel was the lowest in Zamzam water, and the results were seminal compared to the level of nickel in tap water and well water.

Mineral compositions in drinking water have been studied all over the world since the last century. Concentrations of minerals in Zamzam water, tap water and well water. The concentrations in the samples that were studied were within the permissible limits. Magnesium is responsible for nerve activation, muscle contraction, building protein DNA is doubled (NIH, 2018). Magnesium helps prevent osteoporosis (Remer., 1994). The concentration of magnesium in bottled water was much higher than in tap water and bottled water. Similar results were obtained by Saleh et al. (Saleh et al 2001) indicating that bottled water contains a higher concentration of Mg (19.54 mg/L) than tap water in Egypt (14.0 mg/L). As well as (Azlan, et al.2012) reported that bottled water had a higher magnesium concentration (1.82 mg/L) than tap water (1.1 mg/L) in Malaysia.

Table 2. shows the concentration of some mineral elements in Zamzam water, tap water and well water (mg/L).

NO	SAMPL	mg	zn	Fe	Pb	Cu	Cr	
1	**Zamzam water**	7.923 A	-0.007 C	-0.028 B	0.004 A	-0.001 A	-0.004 B	
2	**Tab water**	6.300 B	0.011 B	-0.025 B	0.003 A	-0.001 A	-0.004 B	-
3	**Well water**	0.00 C	0.037 A	-0.025 A	0.004 A	-0.001 A	0.00 A	-

Means with different letters within each column differ significantly (P≤0.05) according to Duncan's test.

Zinc plays a major role in the regular growth and maintenance of the immune architecture, such as in the interaction of lymphocytes with mitogens and as a cofactor for thymulin hormone (Delafuente ,1991) (Fraker et al,1986). There are data on the toxic action of zinc after breathing or skin exposure As the zinc level is elevated in people's urine or blood, the contaminated water is absorbed by the muscles (ATSDR,2005). Lead exposure is associated with several health effects such as impaired growth, impulsivity, nervous dispersal and nearsightedness, and lowered IQ (Council on Environmental Health, 2016) .But lead testing is not required in water (NCSL,2020). Copper concentrations in drinking water of 3 mg/L or greater have been associated with cases of copper toxicity, suggesting that increasing copper concentrations to 3 mg/L or greater may cause an increase in liver disease in the population (Pizarro et al. 1999). While some minerals are essential to human health at trace concentrations due to their role as coenzymes such as iron and copper, others are toxic at any concentration level for example lead, cadmium and chromium (Merian ,1984). Maximum limits for nickel nanoparticles in water by United

States Environmental Protection Agency 1989 (0.0 2 mg/L), European Union 1998 (0.02 mg/L), World Health Organization 2003 (0.02 mg/L). While many states require a lead-water test.The concentrations of trace metals such as iron, copper, zinc, chromium, and other heavy metals in the study samples were lower than the values reported by (Chiba et al,2006) and (Guler and Paslan, 2009). The mineral concentrations in the study samples were comparable with previous studies (Stangnaro and Caramel, 2011). where the mean concentrations were less than the n values reported by G¨uler and Alpaslan (Guler and Paslan, 2009).. A study by (Naddeo et al. 2008) showed that the bottled mineral water in Italy contains higher concentrations of minerals than the samples of the current study in Zamzam water, well water and tap water in Sulaymaniyah Governorate in the Kurdistan Region of Iraq, with the exception of copper and nickel, which were in trace amounts. However, the concentration of minerals in the current study was lower than the concentration found in tap water obtained from Japan and Kazakhstan (Chiba et al.,2006). The concentrations of micro-metals in our study samples were lower than the concentrations found in tap water samples in Egypt, with the exception of copper as reported by (Chiba et al.,2006). Japanese tap water samples contain a low concentration of iron. The studied samples contain lower concentrations of heavy metals compared to the tap water samples in Egypt, with the exception of nickel concentration. Moreover, the concentrations of the studied minerals present in the samples of the current study were lower than those in the tap water of Egypt. revealed that water storage conditions may also alter the composition of the water. Also, high temperatures may stimulate crystal formation and precipitation depending on the composition of the water. The authors indicated that the presence of Mg2 +, SO4 2-, Na + and K +, among other components, may reduce this effect on water. And the possibility that some concentrations differ in our study is due to the season or the preservation of water in bottles and the source of the samples.

Conclusions

This study evaluated some mineral elements in well water and tap water and compared them to Zamzam water that people commonly consume. All metal concentrations were found in the studied samples and were below the international standard limits, above the standard limits recommended by EU standards and US EPA regulations and above the maximum permissible level recommended by the 2006 WHO guidelines and EU standards. For 1998, our study shows that Zamzam water contains an acceptable chemical composition, with the exception of the total dissolved substances in some of the studied samples. The results of this study indicate that the regular determination of minerals is important to prevent the occurrence of mineral toxicity due to drinking this water.

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