International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611

Role of Laboratory Tests and Ultrasound in Detection of the Dangers of Total Dissolved Solids in Drinking-Water

Ayman Ahmed Kosba[1], Ibrahim A Ginawi[2], Awdah Al-Hazmi[3], Ibrahim Abdalla Mohamed Elshikh[4], Waleed S. Mohamed[5], Amir Mahgoub Awadelkareem[6]

Pathology Department, [1]Family Medicine Department, [2]Physiology Department, [3]College of Medicine, Hail University, KSA; Diagnostic Radiology Department, [4]College of Applied medical Sciences, Hail University, KSA; College of Medicine, [5]Taif University, KSA; Clinical Nutrition Department [6]College of Applied medical Sciences, Hail University

Abstract: ***One of the primary goals of WHO and its member states is that "all people, whatever their stage of development and their social and economic conditions, have the right to have access to an adequate supply of safe drinking water Total dissolved solids (TDS) is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The principal constituents are usually calcium, magnesium, sodium, and potassium cations and carbonate, hydrogencarbonate, Chloride, sulfates, and nitrate anions The method of determining TDS in water supplies most commonly used is the measurement of specific conductivity with a conductivity probe that detects the presence of ions in water. Conductivity measurements are converted into TDS values by means of a factor that varies with the type of water (1,2). The practical quantitation limit for TDS in water by this method is 10 mg/litre (M. Forbes, personal communication, 1988). High TDS concentrations can also be measured gravimetrically, although volatile organic compounds are lost by this method (3). The constituents of TDS can also be measured individually. The main source of drinking water in Saudi Arabia (4). TDS in water supplies originates from natural sources, sewage, urban and agricultural run-off, and industrial wastewater. Salts used for road de-icing can also contribute to the TDS loading of water supplies. Concentrations of TDS from natural sources have been found to vary from less than 30 mg/litre to as much as 6000 mg/litre (5)***

Keywords: Ultrasound, Physical analysis of TDS

1. Materials and Methods

In this study, we conducted several steps for both Radiological and mineral tests in Hail, Saudi Arabia. We exams more than 100 patients from 5 regions of Hail by Ultrasound (i.e. Project, Alkhuta, Ugda, Qnaa and Twaren). Similarly, 50 samples of tap water were obtained from all these 5 different areas of Hail.

Step 1

Two-ml. samples were taken from 5 randomly selected households for each 5 region of Hail. Samples were obtained after opening the faucet and allowing tap water to run for approximately 10 minutes. A total of 50 samples of tap water were taken from all 5 areas of Hail. All samples were stored placed in sterilized tubes prior to laboratory tests.

The measurements of TDS in water samples were carried out according to the standard methods of APHA and Sawyer et al. (1994) by the filtration process. Therefore, the accuracy and precision of following methods are well approved and cited in the scientific literature. The TDS of the water samples were determined by the gravimetric method. After filtration for TSS analysis, the filtrate was heated in oven at above 100°C until all the water was completely evaporated. The remaining mass of the residue represents the amount of TDS in a sample.

Step 2

Examine 20 patients for each 5 region of Hail in various ages from 10 to 60 years by ultrasonography and saved all images and reports by portable ultrasound machine.

Step 3

Analyze and conjugate all results each other.

2. Results

In early studies, inverse relationships were reported between TDS concentrations in drinking water and the incidence of cancer (6), coronary heart disease (7), arteriosclerotic heart disease (8), and cardiovascular disease (9,10). Total mortality rates were reported to be inversely correlated with TDS levels in drinking-water (11,12). It was reported in a summary of a study in Australia that mortality from all categories of ischaemic heart disease and acute myocardial infarction was increased in a community with high levels of soluble solids, calcium, magnesium, sulfate, chloride, fluoride, alkalinity, total hardness, and pH when compared with one in which levels were lower (13). No attempts were made to relate mortality from cardiovascular disease to other potential confounding factors. The results of a limited epidemiological study in the former Soviet Union indicated that the average number of "cases" of inflammation of the gallbladder and gallstones over a 5-year period increased with the mean level of dry residue in the groundwater (14). It should be noted, however, that the number of "cases" varied greatly from year to year in one district, as did the concentration of dry residue in each

district, and no attempt was made to take possible confounding factors into account.

By our examinations by ultrasound we detected 40% of cases renal stones and more gravels, 10 % of renal cysts and 2% within renal, ass and 48% within normal tecture.

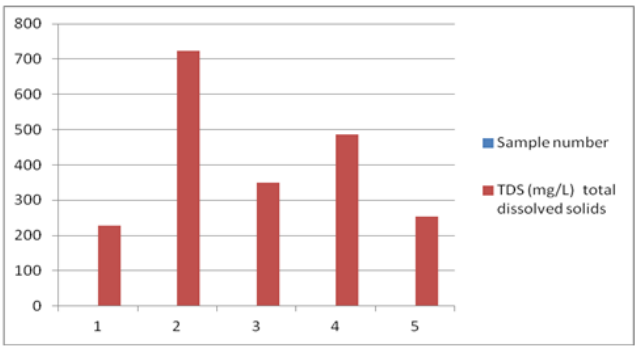
The Physical analysis reveals;

The total dissolved solids (mg/L) content of water samples:

This table un needed

	Sample	TDS $_{(mg/L)}$
1	Project	229
2	ALkhuta	724
3	Ugda	350
4	Qnaa	487
5	Twaran	254

The graph is satisfied



3. Discussion and Conclusions

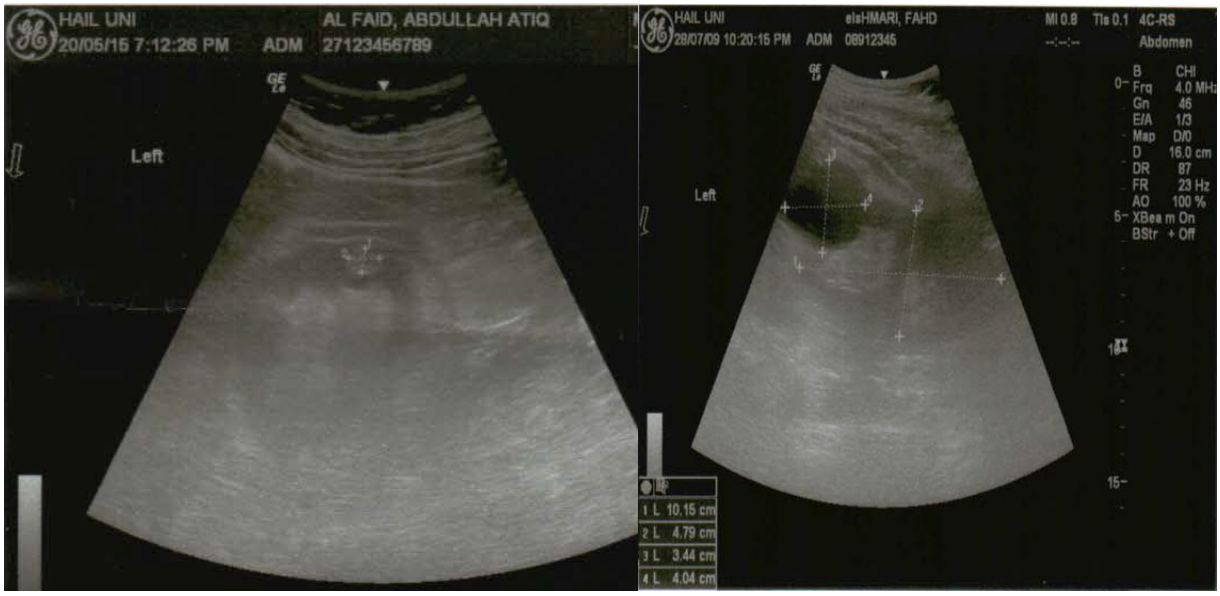
The results of TDS of tested drinking water samples are presented in graph (1). The results revealed that ALkhuta and Qnaa had the highest values while the Project recorded the lowest value. According to WHO, nearly 80% of all the diseases in human beings are caused by water (Venkateswarlu *et al*., 2011).

The differences between the numbers of the total dissolved solids in different area focused their attentions on more detected Qnaa directly increase with increasing TDS, this study covers a 100 patients and 50 samples tap water. Those tested and analyzed (material and method)

References

[1] International Organization for Standardization. *Water quality—determination of electrical conductivity.* Geneva, 1985 (ISO 7888:1985)
[2] Singh T, Kalra YP. Specific conductance method for *in situ* estimation of total dissolved solids. *Journal of the American Water Works Association*, 1975, 67(2):99
[3] Sawyer CN, McCarty PL. *Chemistry for sanitary engineers*, 2nd ed. New York, McGraw-Hill, 1967 (McGraw-Hill Series in Sanitary Science and Water Resources Engineering)
[4] 4-AI-Abdula'aly, AI. 1997. Fluoride content in drinking water supplies of Riyadh, Saudi Arabia. Environmental Monitoring and Assessment, 48:261-72
[5] WHO/UNEP, GEMS. *Global freshwater quality.* Oxford, Alden Press, 1989
[6] Burton AC, Cornhill JF. Correlation of cancer death rates with altitude and with the quality of water supply of the 100 largest cities in the United States. *Journal of toxicology and environmental health*, 1977, 3(3):465-478
[7] Schroeder HA. Relation between mortality from cardiovascular disease and treated water supplies. Variation in states and 163 largest municipalities. *Journal of the American Medical Association*, 1960, 172:1902
[8] Schroeder HA. Municipal drinking water and cardiovascular death rates. *Journal of the American Medical Association*, 1966, 195:81-85
[9] Sauer HI. Relationship between trace element content of drinking water and chronic disease. In: Trace metals in water supplies: occurrence, significance and control. *University of Illinois bulletin*, 1974, 71(108):39
[10] Craun GF, McGabe LJ. Problems associated with metals in drinking water. *Journal of the American Water Works Association*, 1975, 67:593
[11] Crawford M, Gardner MJ, Morris JN. Mortality and hardness of water. *Lancet*, 1968,1:1092
[12] Meyers D. Mortality and water hardness. *Lancet*, 1975, 1:398-399
[13] Popov VV. [On the question of a possible relationship between morbidity of the population with cholelithiasis and cholecystitis and the salt content and hardness of drinking water.] *Gigiena i sanitarija*, 1968, 33(6):104-105 (in Russian)
[14] Tihansky DP. Economic damages from residential use of mineralized water supply. *Water resources research*, 1974, 10(2):145
[15] Sawyer,C.N., McCarty,P.L., and Parkin,C.F. Chemistry for Environmental Engineering, McGraw-Hill, 1994
[16] APHA: American Public Health Association, Standard Methods: For the Examination of Water and Wastewater, APHA, AWWA, WEF/1995, APHA Publication, 1995
[17] Venkateswarlu P., Suman M. and Narasimha Rao C., Research Journal of Pharmaceutical Biological and Chemical Sciences, 2 (2), 464 (2011)

Figures



Renal Mass

Renal Cyst