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# Seasonal Analysis of Physico-Chemical Parameters of Ground and Surface Water in Kaam Area, Libya

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***Abstract:*** *Water is a blessings of Allah and it is a very precious resources of this planet where is an established resources of life. Water is considered as one of the nutrients, although it yields no calories. Water in nature is not pure as it gets contaminated surroundings. Physical parameters like Electrical conductivity and TDS have more than the normal values. The high TDS is because of more salinity of water samples and close to the Mediterranean Sea. Chemical parameter like Calcium is in normal level for drinking water quality and Ammonia is normal in well waters but more in waadi kaam waters. Alkalinity, Total Hardness, Chlorides, Magnesium, and sodium are more than the normal level for potable. Magnesium level is fit for the usage of water for agriculture purposes. Waadi kaam samples have high in all parameters than the well waters. Regarding seasonal analysis, most of the parameters show high during summer. These water samples require suitable treatments such as filtration, chlorination, alum treatment, aeration, neutralization, softening and chemical precipitation, to minimize contamination and make them fit for drinking. This study increases the awareness among the residents of Kaam area of Libya the quality of well waters and the waters from Waadi Kaam at their highest quality and purity levels and it is hoped that the present study may prove to be an useful tool in understanding the water at the desired levels for different beneficial uses of the people residing there. It requires regular surveillance as a control measure.*

***Keywords:*** *Physico-chemical properties, Ground water and Surface water, Libya*

## I. Introduction

Water is the bloodstream of both the biosphere and society (Falkenmark, 2004). The healthy aquatic system depends on Physico-chemical and biological characteristics (Venkatesaraju et al., 2010). The quality of the water in any ecosystem provides significant information about the available resources for supporting life in that ecosystem. Good quality of water resources depends on the large number of physico-chemical parameters and biological characteristics. By 2025, no fewer than 25 of the 48 countries that are expected to be facing water shortages will be African. This means that approximately 230 million Africans (16% of the projected population) will be living in water-scarce areas (<1,000 cubic metres of water/capita/year) with another 460 million (32%) in water-stressed areas (1,000-1,700 cubic metres/capita/year). Africa has 17 rivers with catchment areas greater than 100 000 $km^2$ and all present near the equatorial region. Groundwater is extremely important in Africa. It is estimated that over 40% of Africans use groundwater as their main source of drinking water, particularly in North and Southern African countries. It is the major source of water supply for domestic purposes also. The quality and purity of the ground water has direct effect on human life. The problem of the ground water is more acute and can be seen in highly populated areas (Salem and Alshergawi, 2013).

Libya is famous for the great "Sub Saharan Desert" with low rainfall. So here water is the most precious, vital and important commodity in the country. From the ancient times, no much rainfall and storage of water is scarce. Most of the population of Libya are residing at the northern part of coastal Libya. Aim of the study is to collect the ground (Wells) and surface (Waadi Kaam-river) and to find out the suitability of use of that water by analysing physico-chemical properties.

## II. Materials And Methods

**Place of work:** The research work of collecting water samples from the different wells and Wadi kaam are from the Kaam, Al-margeb provice, Libya and analysis of the collected water samples were at the laboratory of Faculty of Science, Al-margeb university, Al-khoms, Libya.

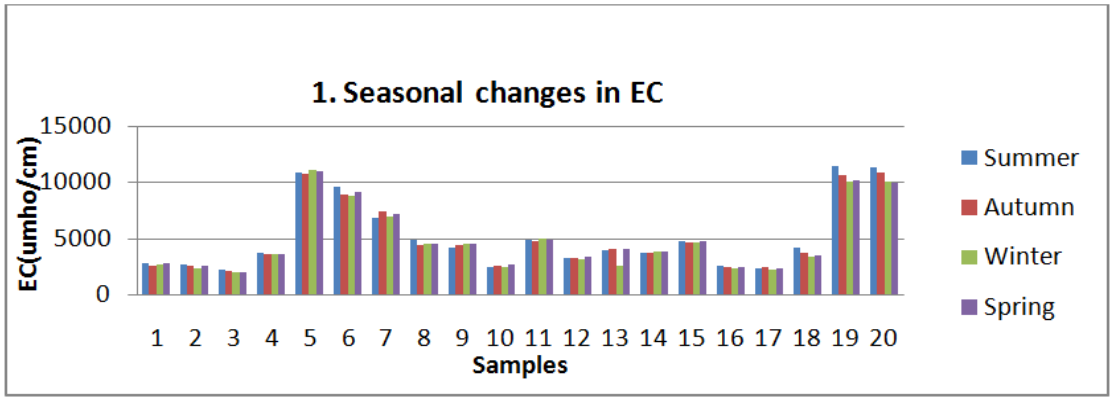
**Duration of the work:**The study duration for the project was from May 2013 to April 2014.

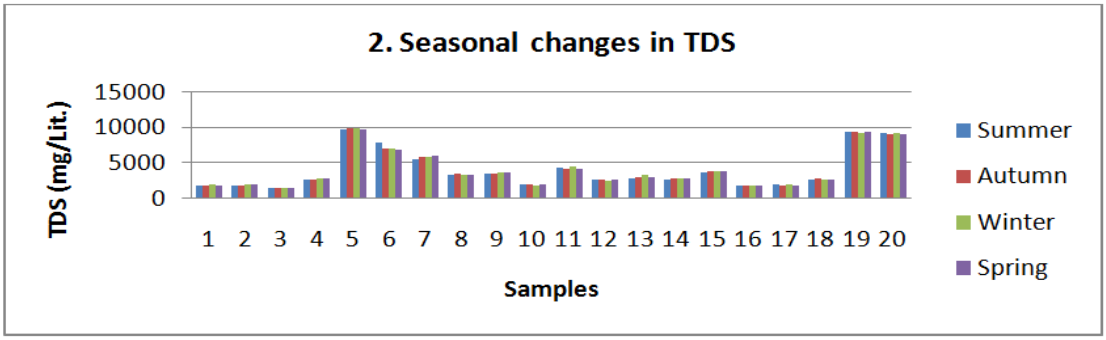
**Sample size:**Total water samples collected were 20 (15 well waters (sample 1-15) and 5 Wadi Kaam waters (samples 15-20).

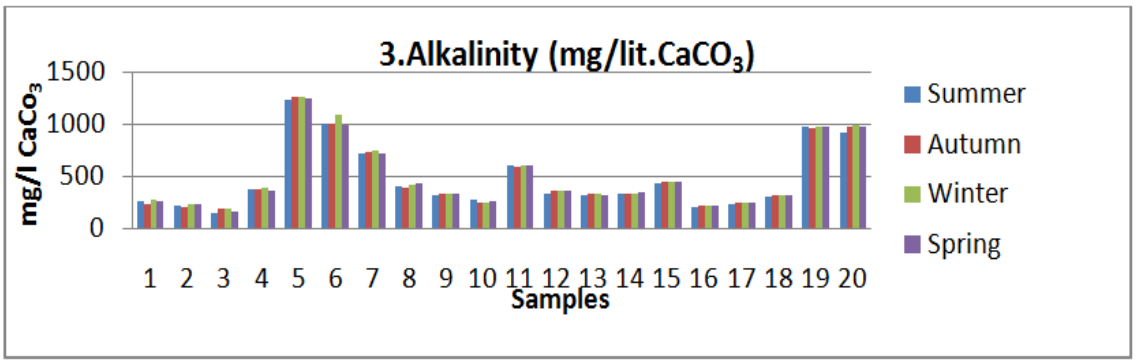
**Sample Collection:** Well waters and Wadi Kaam waters were collected randomly using plastic water bottles.
**Analysis:** Electrical conductivity also measured with the help of an Instrument ELICO (South Korea), TDS were measured at 25$^{o}$C using the TDS Meter 5031 (Ezodo Company), Alkalinity by titrimetric method with $H_2SO_4$(APHA, 1985: pp 265-268), Total Hardness by EDTA titrimetric method (APHA, 1985: pp 210-213), Ammonia by Titration method using standard 0.02N Sulphuric acid with boric acid indicator solution, Calcium by EDTA titrimetric method, Chloride by Argentometric method (APHA, 1985: pp 287), Magnesium also by EDTA titration method and Sodium by Flame photometry.

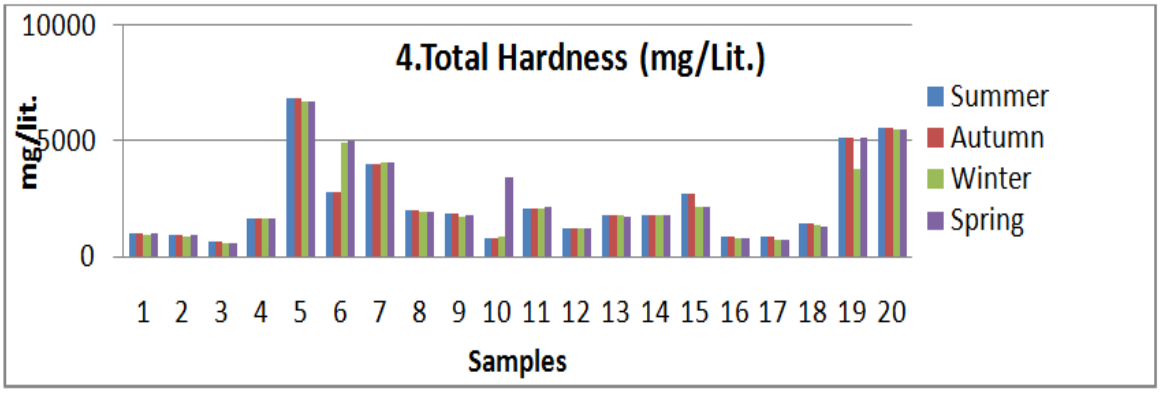
## III. Results and Discussions

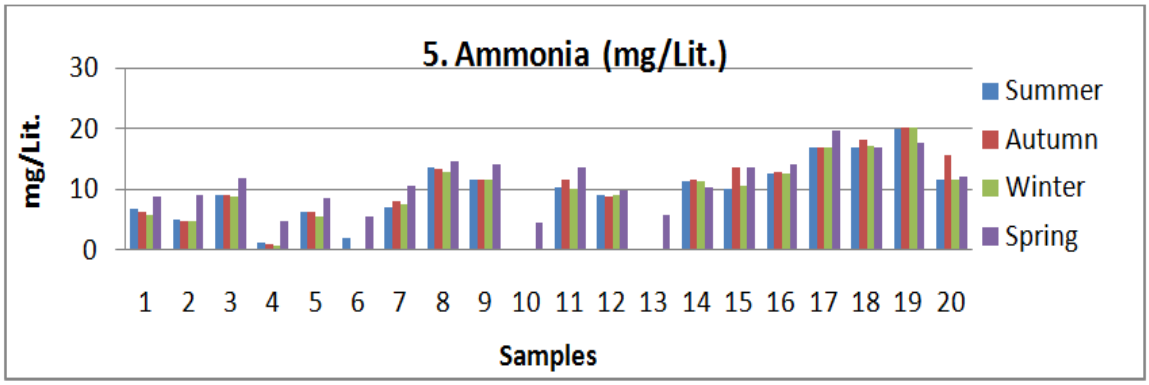
The physiochemical characteristic of water is important determinant of the aquatic system. Their characteristic is greatly influenced by climatic vegetation and general composition of water. The EC values are more in the summer and autumn. But from the samples of wells of 5, 6 and 7 and 19 and 20$^{th}$ samples of Waadi kaam have some mixed results (Fig.1). In the study of Neerja kalra et al., (2012) in India, EC level came down during monsoon or rainy season. Aqel (2012) studied in Saudi lake water and observed that the electric conductivity values of the lake sites ranged from 48970 to 48390 µS/cm.

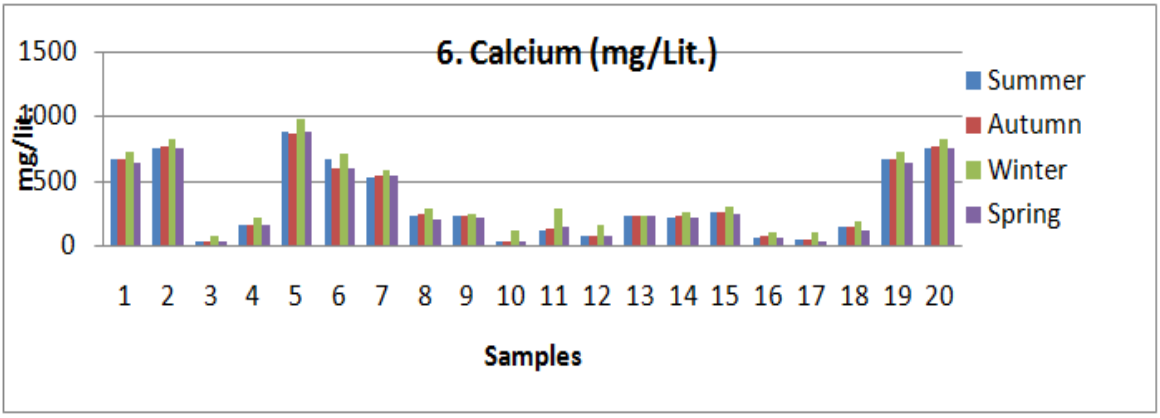


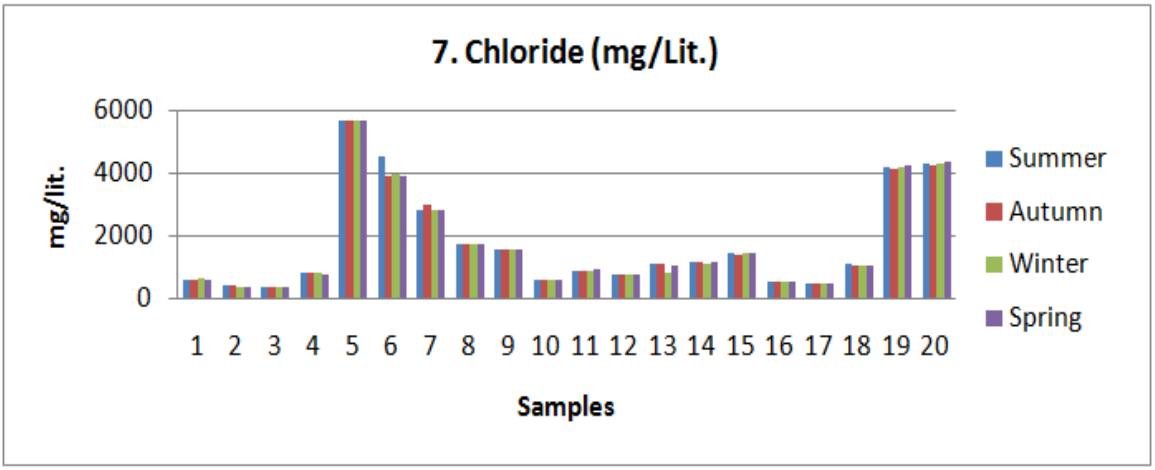



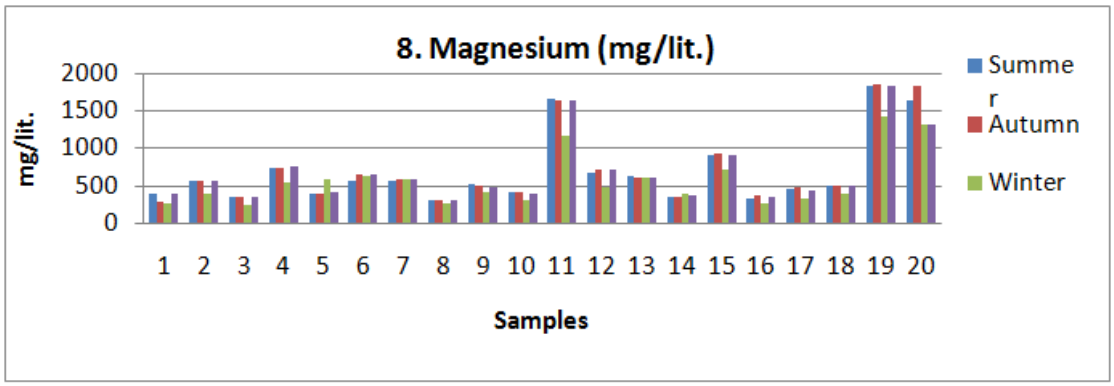



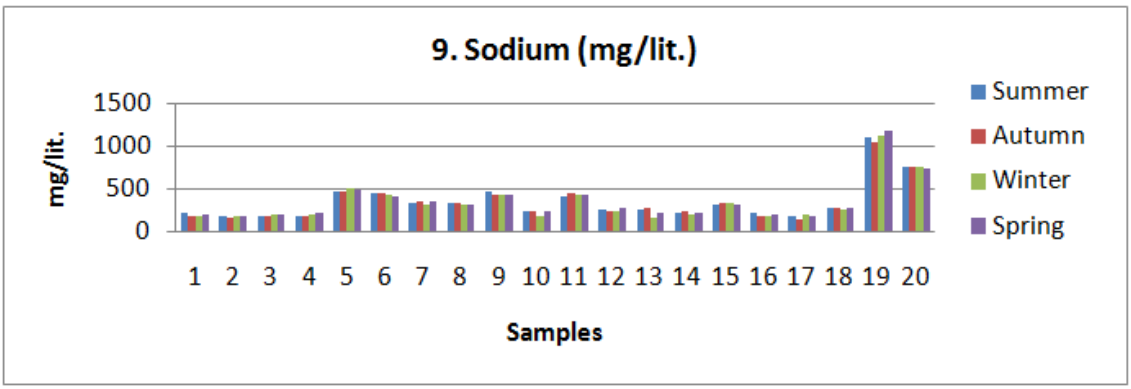

4.Total Hardness (mg/Lit.)
mg/lit.
10000
5000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Samples
Summer
Autumn
Winter
Spring


5. Ammonia (mg/Lit.)
mg/Lit.
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Samples
Summer
Autumn
Winter
Spring


6. Calcium (mg/Lit.)
mg/lit.
1500
1000
500
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Samples
Summer
Autumn
Winter
Spring


7. Chloride (mg/Lit.)
mg/lit.
6000
4000
2000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Samples
Summer
Autumn
Winter
Spring




TDS is more in summer and followed by autumn except sample number 5. Sample number 5, 6, 7, 19 and 20 have high TDS than the other samples. These variations in TDS in the present study are due to soil nature, rain fall and the presence salinity (Fig.2). Seasonal variations in alkalinity (Fig. 3) also reveals that the samples (5,6,7, 19 and 20) have more alkalinity particularly in Autumn and winter.

More hardness was noticed in 5, 6, 19 and 20 of water samples (Fig. 4). This hardness can be reduced by Ion-Exchange and Reverse osmosis technique. Present result also matches with the Thomas et al., (2011). They reported that total hardness was in the range of 230.00±13.15 - 457.20±105.42 mg/l, with no significant seasonal variation. Higher total hardness could be due to discharge of effluents and untreated waste from polluting industries to nearby surface water sources. Highest value of total hardness was observed during summer. It could be due to the low water level and high rate of evaporation during summer. Aqel (2012) result also revealed that the hardness of water in studied area of Saudi Arabia have higher level of hardness. The effect of hardness is Scale in utensils and hot water system in boilers etc. soap scum's Sources are Dissolved calcium and magnesium from soil and aquifer minerals containing limestone or dolomite.Highest level of Ammonia is reported from the samples of 8,9,11 and 15-20 (Fig 5). Here more quantity is observed during spring seasons. This shows more bacterial activity in the spring seasons and favourable seasons for their growth. This more presence of Ammonia in many water samples indicate more pollution and favours for the growth of more algae and other microorganisms. Study of Calcium in different seasons are reported in Fig. 6., calcium levels are high in the samples of number 1, 2, 5, 6, 7, 19 and 20 mainly during winter.

Fig.7 expressed the data of seasonal variations of Chloride ions. Sample numbers 5, 6, 7, 19 and 20 have very high amount of chloride particularly during summer. During this period, rainfall less and temperature was high. Other research shows the same result with high chloride ion in the summer (Salem et al., 2013). Seasonal variations of magnesium content (Fig. 8) in the samples of studied area with high in the 11, 19 and 20$^{th}$ sample numbers. Increased level is observed in summer followed by autumn and spring. Seasonal changes of the sodium ion (Fig. 9) with more value are reported in the sample numbers of 5, 6, 9, 19 and 20.

By and large, most of the water samples need proper treatment to use as drinking water. For agriculture purposes, there is no need for any treatment. All the water samples except the sample number 19 and 20 of waadi kaam, can be used as Agriculture purposes. Quality water supply is one of the requirements for human existence. The quality of water is examined to assess its hygienic level as well as its suitability for general use (Ohanu et al., 2012). Most of the samples are having most of the parameters above the limit of an International standard. Proper treatment is necessary before use for various purposes.

## IV. Conclusion

Physical parameters like Electrical conductivity and TDS have more than the normal values. The high TDS is because of more salinity of water samples and close to the Mediterranean Sea. Chemical parameter like Calcium is in normal level for drinking water quality and Ammonia is normal in well waters but more in waadi kaam waters. Alkalinity, Total Hardness, Chlorides, Magnesium, and sodium are more than the normal level for potable. Magnesium level is fit for the usage of water for agriculture purposes. Waadi kaam samples have high in all parameters than the well waters. Regarding seasonal analysis, most of the parameters show high during summer. These water samples require suitable treatments such as filtration, chlorination, alum treatment, aeration, neutralization, softening and chemical precipitation, to minimize contamination and make them fit for drinking. This study may increase the awareness among the residents of Kaam area of Libya the quality of well waters and the waters from Waadi Kaam at their highest quality and purity levels and it is hoped that the present study may prove to be an useful tool in understanding the water at the desired levels for different beneficial uses of the people residing there. It requires regular surveillance as a control measure.

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