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Biochemical and microbiological analysis of water of Khandala Tahsil and adjoining areas

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ABSTRACT

Water in its natural form contains number of salts, alkalies, microbes and particulate pollutants. Due to industrialization and other anthropogenic activities; the purity of water is critically threatened. Due to the increasing relevance of these, the necessity of water analysis is felt desirable. Also the contents vary from place to place. Analysis of water in 20 km radius around Lonand was analyzed for the pH, conductivity, soluble electrolytes like sodium, potassium, chlorides, calcium. The microbial investigation was done to see the safety of water. The present investigation provides the data for pH, conductance, hardness, Na⁺, K⁺, Cl⁻, Ca⁺⁺ ions and microbiology including Klebsiella and E.coli estimation. The experimental observations show high variation of conductance, slight variation in pH in the local reservoir waters. As water is an indispensable part of all the processes, its proper analysis and treatment is necessary.

Keywords: Water analysis, anthropogenic, microbial analysis.

INTRODUCTION

Water is the source of all biological lives and their sustenance too depends on the same. Water for different purposes has its own requirements for the composition and purity and each body of water has to be analysed on a regular basis to confirm the suitability. But the proportion of contaminants in water has increased. Such water is often used for domestic purposes and even for drinking. These contaminants in turn have ill-effects on biological life on the earth. The microbes were investigated by standard microbiological investigations[1]. In humans they represent the dreadful Cholera, Typhoid, Amoebiasis, Jaundice, Enterobacteriaceae, Colitis,

Diarrhoea etc. Depending on these observations it is highly suggestive that further detailed investigations of the water purifying plants, storage tanks and pipe lines as well as other sources of water is desirable [2].

Therefore in the present investigation, biochemical and microbiological analysis of water of Khandala Tahsil and adjoining areas is undertaken.

EXPERIMENTAL SECTION

The study area was confined along the contours of Lonand ($18^{\circ} 12'' N$ Lat & $74^{\circ} 10'' E$ Long; $+556m$ msl) at a radius of about 20 km. Water samples were collected from the local reservoirs, water purification plants, tap waters and sealed in air tight containers to prevent contamination. Microbiological analysis was done immediately, as the microbes would die in the isolated water. This investigation was done by standard methods using BOD incubator, Classic Scientific CS-01, Colony Counter. pH was estimated using pH meter TMP- 85, electrolyte estimation on Cornlay Acculyte 5P Electrolyte analyzer Mod. No. F315AL. The hardness was calculated by standard methods[3].

Observations

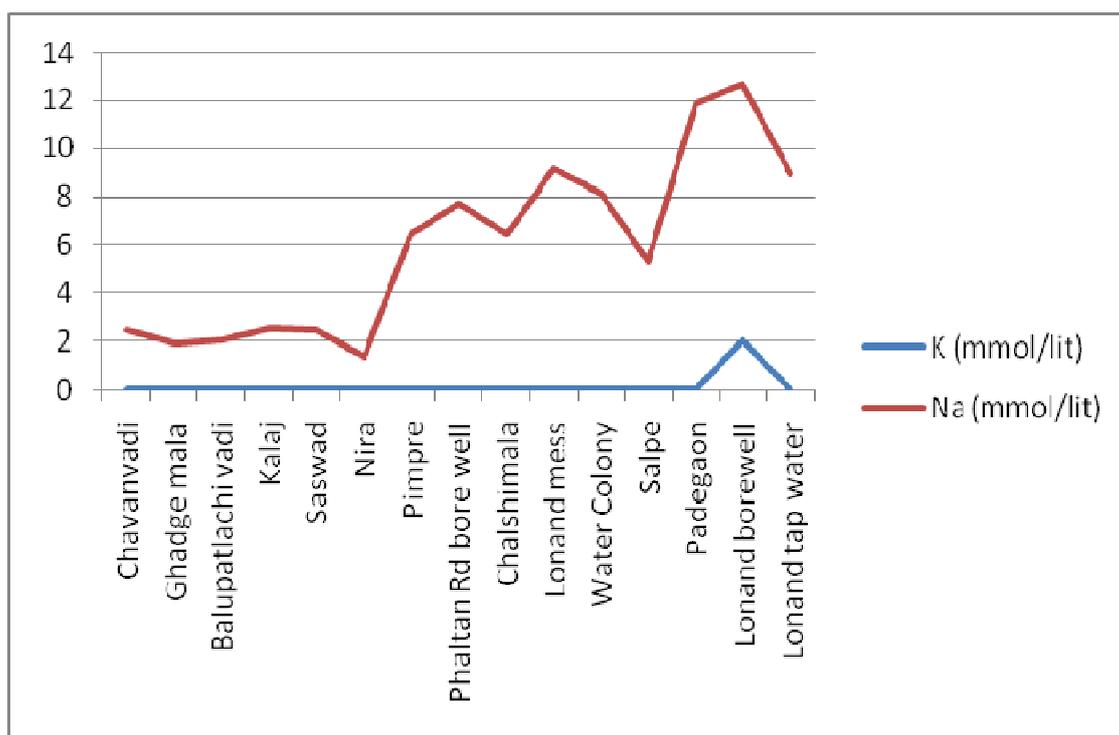


Fig. 1 : Estimation of Potassium and Sodium(m mol/ lit)

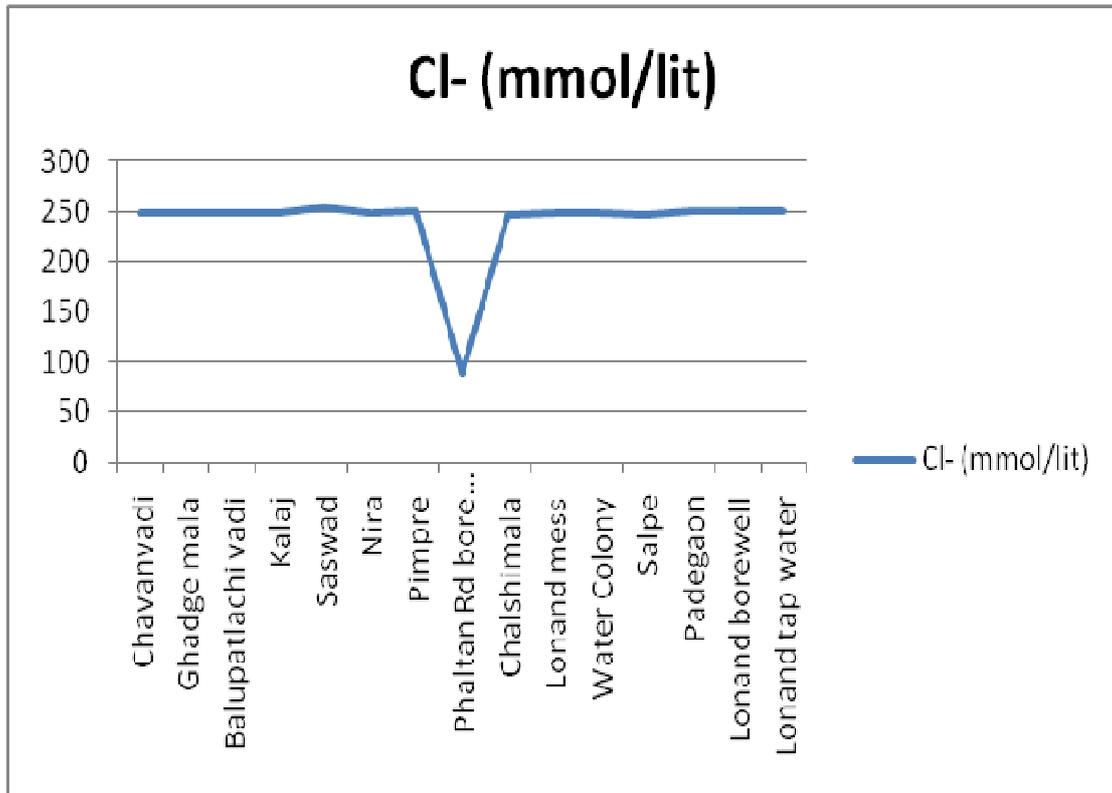


Fig. 2: Estimation of Chloride ions (m mol/ lit)

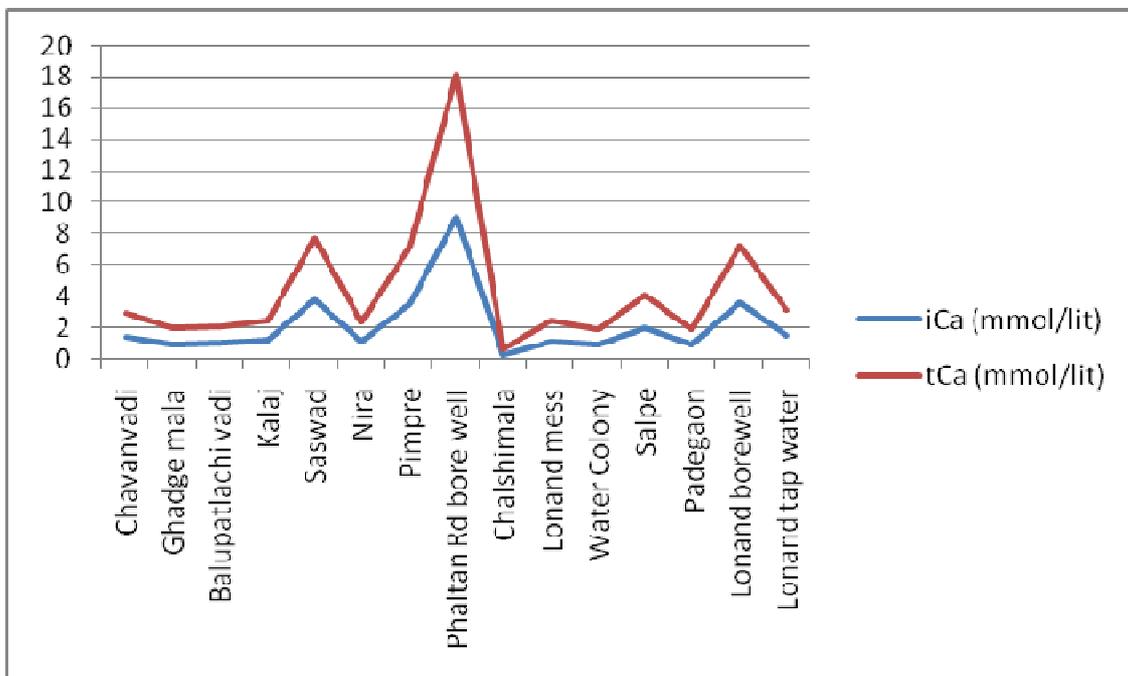


Fig. 3: Estimation of Total Calcium (tCa) and Ionic Calcium (iCa) (m mol/lit)

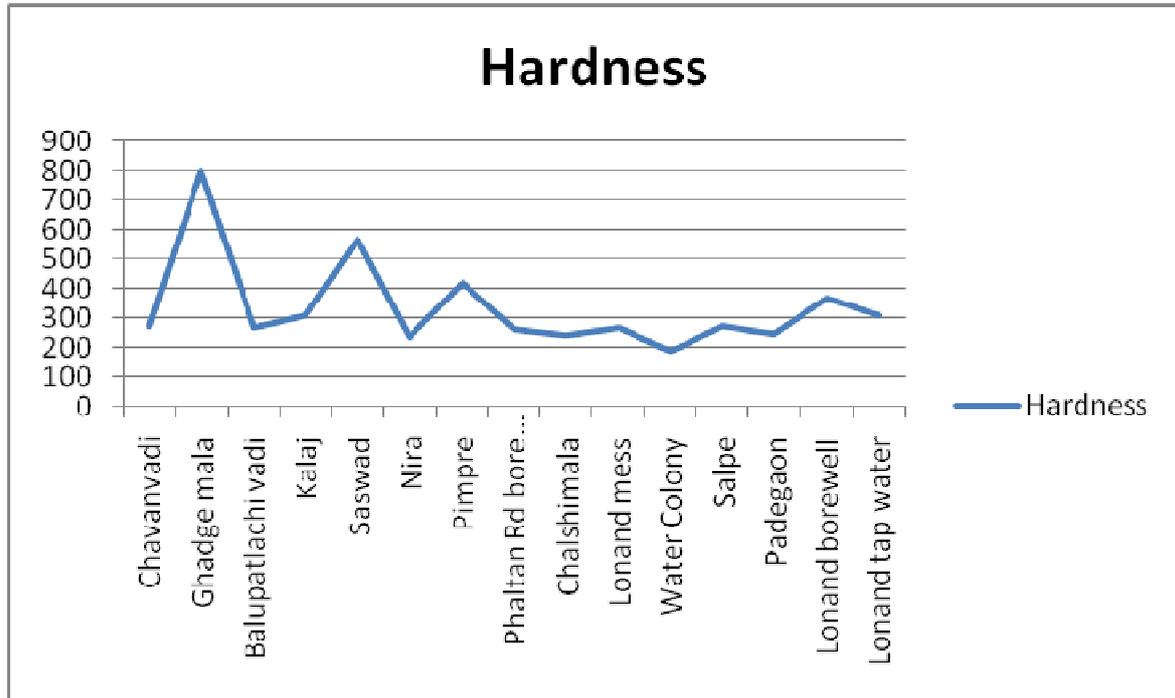


Fig. 4: Hardness

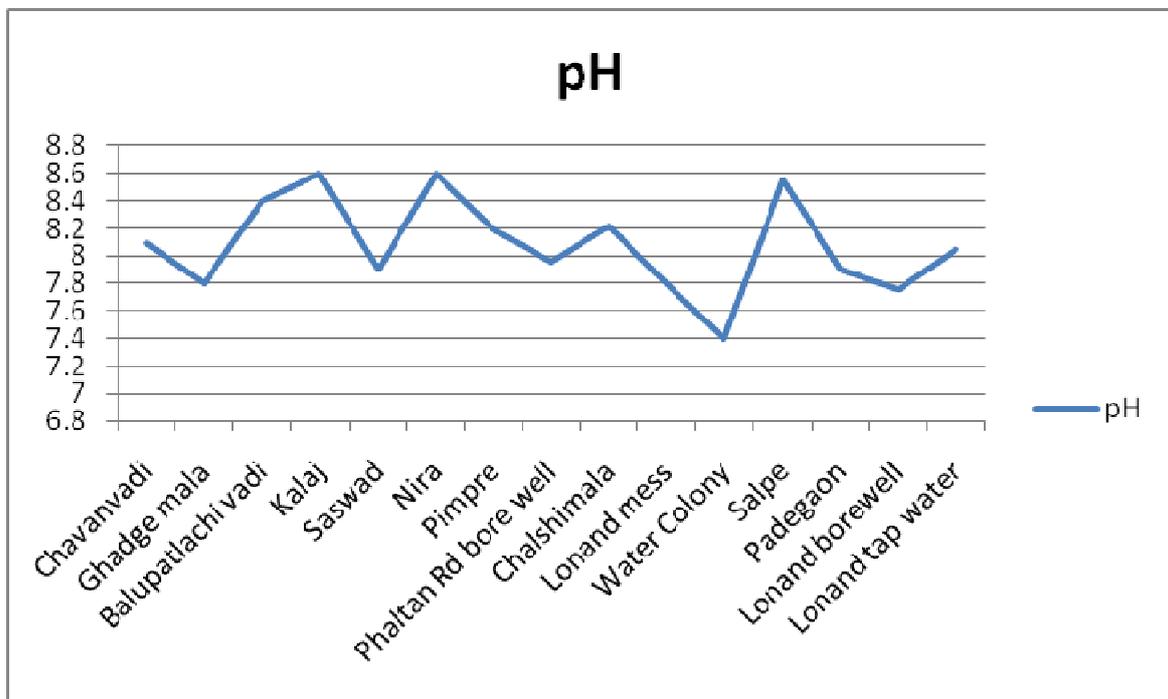
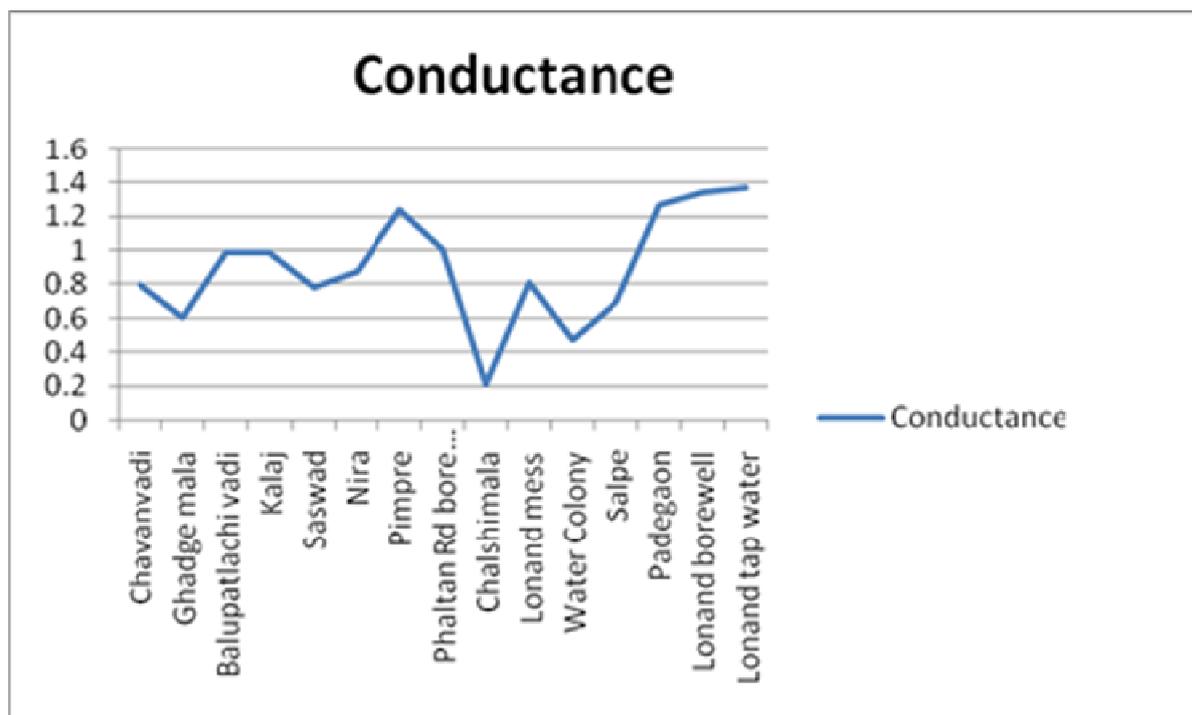


Fig. 5: pH estimation

**Fig. 6:Conductance**

RESULTS AND DISCUSSION

It was observed that pH of all the tested waters were between 7.65 to 8.86, variable amount of sodium (Na^+), potassium (K^+), chloride (Cl^-) and calcium (Ca^{++}) was evident. The content of Chloride is more than the permissible level which is alarming. The degree of hardness ranges from hard to extremely hard which is undesirable[4-7]. Microbiological investigations revealed that most of the samples were positive for klebsiella and E. coli species. The pH ranges between acceptable and undesirable limit. (Nira- 8.6). The colony of E.coli was around 6×10^6 CFU/ ml while that of Klebsiella was 1×10^6 CFU/ml.

CONCLUSION

The microbiological tests revealed alarming proportion of E.coli and klebsiella in all samples, which cause Diarrheal diseases, hepatitis and cholera[8-9]. The potable water containing E.coli if stored for a longer time spontaneous growth of this gram -ve bacteria takes place. The overall pH is slightly alkaline which indicates improper chlorination/disinfection. The conductance varies highly. The proportion of electrolytes in water is above permissible level indicating high amount of ions[10].

It is highly recommended that water used for domestic purposes should be purified using suitable purifying agents (alum, medi-chlor), installation of water filters and use of boiled water for drinking purposes.

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