Determination of Chemical and Microbial Contamination in Surface and Ground Water of District Hyderabad, Sindh Pakistan

Chemical and Microbial Contamination in water

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ABSTRACT

Objectives: Objective of the study was to assess Microbial & Chemical contamination load in drinking water sources.

Study Design: A prospective / descriptive study

Place and Duration of Study: This study was conducted at the District Hyderabad in September, 2016 to December, 2016

Materials and Methods: Illustrative drinking water sources samples were collected and analysed at Water Testing & Surveillance Laboratory, LUMHS, Jamshoro.

Results: Presence of causative agents in drinking water are responsible for different waterborne-illnesses internationally reported, deprived quality of drinking water growing the water pollution not only deteriorates water quality, but also subsidizes to public health complications, economic stress and community disproportion.

Conclusion: This research study indicates the presence of water pollutants in drinking water of Hyderabad city which make water unsuitable for drinking. The current research also aware community and health policy maker to take some positive steps towards this severe situation.

Key Words: Arsenic, drinking water, waterborne illness.

INTRODUCTION

There are two sources of drinking water in Pakistan these are the surface and underground water aquifers whereas the 70% is relies on underground water. The quality of drinking water at Pakistan is not unity and also does not match the WHO recommendations for drinking purpose. Various diseases are occur due to poor quality water in three districts of Sindh i-e Thatta, Badin, and Thar[1]. At the left bank of Indus River the 2nd big city of Sindh Hyderabad district is situated, after the bifurcation of Hyderabad district on 4th April 2005, District Hyderabad now it is comprised of four Talukas i.e. Hyderabad City, Hyderabad Rural, Qasimabad, and Latifabad, 52 Union Councils. According to Census 1998 the population of District Hyderabad after bifurcation is 1494866[2,3]. Due to increasing urbanization the assessment of drinking water of Hyderabad city is become need of day. It is reported that in n India 36% of urban population and 65% rural

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population are not drinking safe water[4].The sources for contamination of drinking water is the improper disposal of solid waste, sewage and heavy usage of fertilizers[5]. According to water quality report (2004) around 30% of diseases and 40% of demise at Pakistan are due to drinking of contaminated water respectively. Therefore observing this critical situation it is imperative to assess the availability of different contaminants in drinking water which make the water unsuitable for drinking for the people of Pakistan.

MATERIALS AND METHODS

Water samples were collected from different areas of Hyderabad and brought to the Water testing & Surveillance laboratory safely in ice box for analysis. The digital turbidity meter (PCCHECKIT, Germany) was used for measurement, and conductivity meter (Model no: sanso-direct con 200) was used to assess the Electrical Conductivity (EC) Salinity, Total Dissolved Salts (TDS)[6,7,8]. Kit method was used to analyze the arsenic availability in water by Merck with detection limit of 0.005mg/L to 0.5mg/L[9]. The bacteriological analysis of water samples was calculated for total coliforms count (TCC) and Total Faecal coliforms (TFC). The samples were handled in a laminar flow hood using sterilized culture media. The bacterial load of water samples was estimated by Most Probable Number (MPN) technique as per Standard Methods for the Examination of Water and Wastewater[10].

RESULTS

The turbidity in present water samples was recorded< 5 NTU and the results was much higher than the limits set by WHO as acceptable.The all physical parameters were also observed under the permissible levels. The samples coded TR: 01 to 07, TQD, 04 & TLD: 06 shows high level of EC, Salinity, TDS and was recorded more than the figures suggested by WHO i-e 1500 µS/cm, 0.2 % to 0.5%, and 500-1000mg/Lrespectively. Chloride was noted above WHO level (250 mg/L) in the samples with codes TR:

01 to 07, TQD, 04 & TL: 06. Arsenic values was also found more in some samples of drinking water beyond the permissible limit, additionally As exist in organic and inorganic forms and poses very severe health impacts.

The bacteriological examination revealed that the all ground water samples shows no growth of E-Coli, Fecal Coliform and Total Coliform, whereas only samples number 17 of drinking water contain unacceptable amount of coliform bacteria shown in Figure 05.

Table No.1:: Sampling Area Record

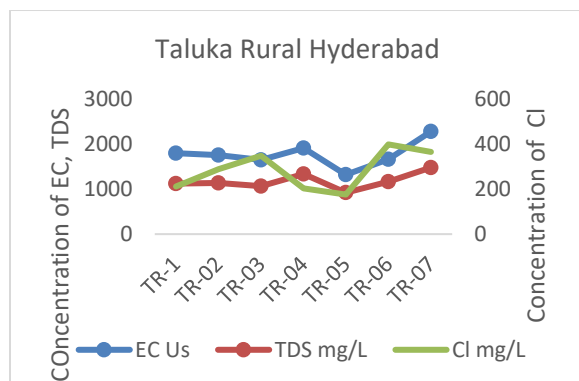| Sampling Area	Sample Code	Source
		M0tor Pump
Tando Hyder, Taluka Rural Hyderabad	TR-02	Hand Pump
Tando Jam Taluka Rural Hyderabad	TR-03	Hand Pump
Tando Qaiser Taluka Rural Hyderabad	TR-04	M0tor Pump
Hatri Taluka Rural Hyderabad	TR-05	Hand Pump
Ghanghra Mori Hatri Taluka City Hyderabad	TR-06	Hand Pump
Hala Naka Taluka City Hyderabad	TR-07	Hand Pump
Tando wali Muhammad Taluka City Hyderabad	TC-01	Water Supply Line
Qasim Chowk, Taluka City Hyderabad	TC-02	Water Supply Line
Sindh university Old Campus colony Taluka City Hyderabad	TC-03	Water Supply Line
Naya Pul, Taluka City Hyderabad	TC-04	Water Supply Line
Badin Stop, Taluka City Hyderabad	TC-04	Water Supply Line
Khaahee Road near Memon Hospital Taluka City Hyderabad	TC-05	Water Supply Line
Pretabad Phuleli, Taluka City Hyderabad	TC-06	Water Supply Line
Qasimabad Phase -I, Taluka Qasimabad Hyderabad	TQD-01	Water Supply Line
Qasimabad Phase-II, Taluka Qasimabad Hyderabad	TQD-02	Water Supply Line
Naseem Nagar, Taluka Qasimabad Hyderabad	TQD-03	Water Supply Line
Wahadat Colony, Taluka Qasimabad Hyderabad	TQD-04	M0tor Pump
Hussainabad, Taluka Qasimabad Hyderabad	TQD-05	Water Supply Line
Alamdar Chowk, Taluka Qasimabad Hyderabad	TQD-06	Water Supply Line
Latifabad No.04, Taluka Latifabad Hyderabad	TLD-01	Water Supply Line
Latifabad No: 08, Taluka Latifabad Hyderabad	TLD-02	Water Supply Line
Latifabad No:12, Taluka Latifabad Hyderabad	TLD-03	Water Supply Line
Latifabad No:02, Taluka Latifabad Hyderabad	TLD-04	Water Supply Line
Indus Pahari, Taluka Latifabad Hyderabad	TLD-05	Water Supply Line
Hashmi Colony Near Fatah chowk, Taluka Latifabad Hyderabad	TLD-06	M0tor Pump

Figure No. 1: Average concentration of ECT, TDS, Cl of Taluka Rural Hyderabad
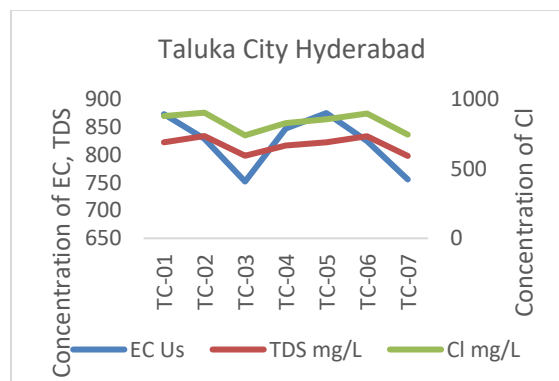

Figure No.2: Average concentration of ECT, TDS, Cl of Taluka city Hyderabad
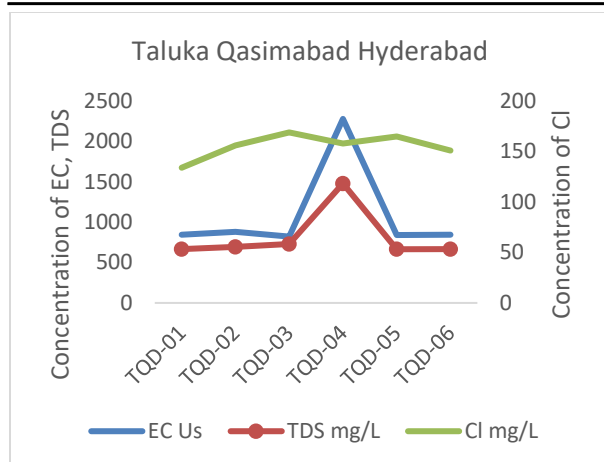
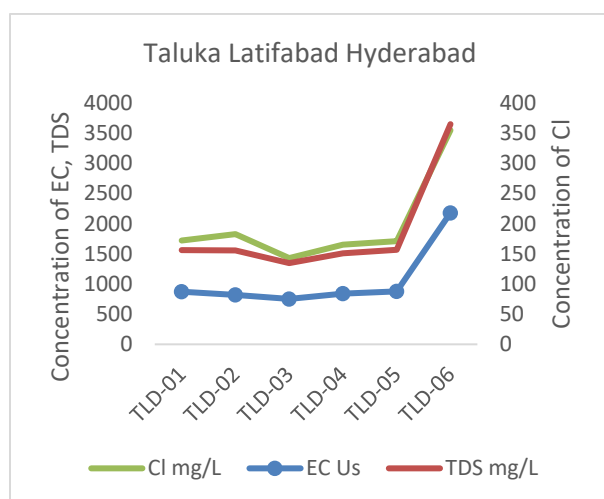**Figure No. 3: Average concentration of ECT, TDS, Cl of Taluka Qasimabad Hyderabad**

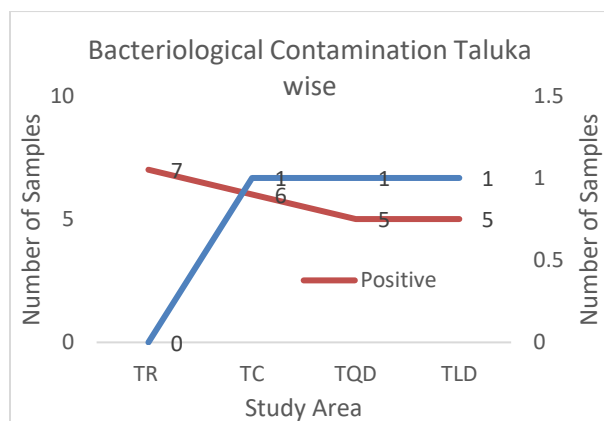**Figure No.4: Average concentration of ECT, TDS, Cl of Taluka Latifabad Hyderabad**

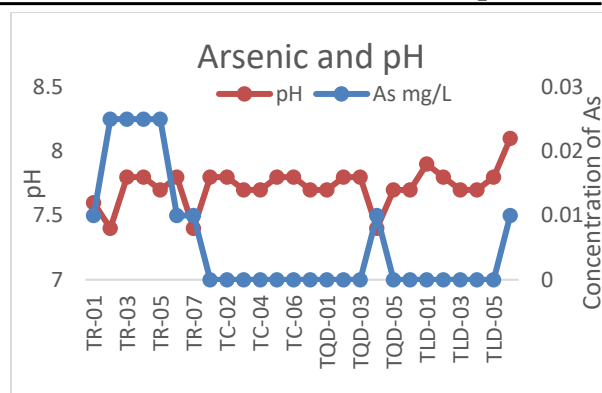**Figure No. 5: Average Bacteriological contamination Taluka wise**

Figure No. 6: Average pH and As concentration

DISCUSSION

The physical parameters observed in this study were show conventionality with the results of a previous researches and ground water samples were observed colorless, odorless but were slight saline[11]. The high turbidity (5 NTU) is probablylinked with higher levels of disease-causing microbes and indirectly constitutes a health problems[12]. Presence of chloride in drinking water affects indirectly upon health by corrosion of pipes which can elevate the metal level of water[13].

The present results for electrical conductance (EC) were in accordance with earlier reported results for ground water samples from Bahawalpur City, Pakistan[14]. The recommended figures for TDS in drinking water is 500 mg/L to 1000 mg/L and the results show similarity with the results for ground water sources from district Matiari, Sindh where the EC, TDS concentration was foundabove the permissible value and pose various health effects[12].Moreover the Arsenic is recognized by its carcinogenicity and causing major public health problems in many countries like Bangladesh, India, China, Vietnam, Nepal and Myanmar[12], the concentration of arsenic in drinking water exceeds the WHO standard of 10 ppb (μg/L) in many areas of Pakistan similar results was conform ina study conducted on drinking water of eleven cities of Punjab[13].

In Pakistan, Sindh the 10 to 50 ppb As contaminated drinking water was affects the life of 16 to 36% population[15]. As in drinking water is reported for lung, liver, skin and bladder cancer[16]. The As pollution is increased due to ore mining and processing industry, dye manufacture facilities, tanneries, thermal power plants, and application of certain insecticides, herbicides and pesticides wastes into drinking water, therefore the contamination level above the 50μg/L and exceeding 200μg/L in Sindh[5, 12].

The water sources usually contain low concentration of heavy metals as they dissolved these substances while

moving downwards as hydrological cycle. The heavy metals are essential for metabolic activities in the body but their over exposure can lead to adverse effects on living organism including humans[17,18].

A few chemicals and arsenic and dangerous metals polluted the drinking water sources and connected with human wellbeing and that sullying prompts to gastrointestinal, liver, kidney, cardiovascular, and neurological infections and malignancy[19,20].

CONCLUSION

The Present research work concluded that the quality of drinking water of district Hyderabad is not suitable for drinking as it contain many toxic contaminants which is linked with many diseases and leads to gastrointestinal, liver, kidney, cardiovascular, and neurological diseases and cancer, in present study the chemical and microbial contaminants left adverse impacts on human health.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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