



**International Journal of Biology, Pharmacy  
and Allied Sciences (IJBPAS)**  
*'A Bridge Between Laboratory and Reader'*

[www.ijbpas.com](http://www.ijbpas.com)

---

**PREVALENCE OF ARSENIC AND MICROBIAL CONTAMINATION IN DRINKING  
WATER-SILENT THREAT TO PUBLIC HEALTH OF TANDO ALLAHYAAR**

**ANEELA ATTA UR RAHMAN<sup>1</sup>, MUHAMMAD ILYAS SIDDIQUI<sup>1</sup>, IRSHAD HUSSAIN  
GHANGHRO\*<sup>2</sup>, MAHVISH JABEEN CHANNA<sup>1</sup>**

Faculty of Community Medicine & Public Health Sciences, LUMHS Jamshoro Sindh<sup>1</sup>

Water Testing & Surveillance Laboratory, LUMHS Jamshoro Sindh<sup>2</sup>

**Corresponding Author: Irshad Hussain Ghanghro: Water Testing & Surveillance Laboratory,  
LUMHS Jamshoro, Sindh: E-mail. [irshadghanghro@yahoo.com](mailto:irshadghanghro@yahoo.com) & [mahvishj.channa@gmail.com](mailto:mahvishj.channa@gmail.com)  
Contact Number: +92 3043733104**

Received 5<sup>th</sup> Nov. 2016; Revised 9<sup>th</sup> Dec. 2016; Accepted 10<sup>th</sup> Feb. 2017; Available online 1<sup>st</sup> April 2017

**ABSTRACT**

Arsenic is a potent carcinogen and a well-known cause of threat for human life. It is stated internationally that the water borne illness is due to microbial and arsenic contamination in drinking water. The availability of contaminants was detected at Water Testing & Surveillance Laboratory, LUMHS, Jamshoro from the samples of drinking water from Tando Allahyaar. The current results were compared with World Health Organization (WHO) permissible limit and the outcomes was found at alarming level for the Tando Allahyaar community which absolutely relies on surface and ground water for drinking purpose, which posed possible hostile health effect on local residents of the study area. This research is the step to evolve and develop a community based awareness and help to found spatial and time-based prevalence of biohazards in drinking water sources of the study area.

**Keywords: Arsenic, drinking water, waterborne illness**

**INTRODUCTION**

Tando Allahyaar is the district in the province of Sindh at Pakistan. Intake of toxic metal through drinking water usually

becomes the major cause of hazardous health effects fluctuating from shortness of breath to several types of cancers in human beings (1).

Arsenic (As) is documented for many public health issues in Bangladesh, India, China, Vietnam, Nepal and Myanmar (2). In Pakistan, Sindh the 10 to 50 ppb As contaminated drinking water was affects the life of 16 to 36% population (3). As in drinking water is reported for lung, liver, skin and bladder cancer (4). 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, 6). The gastroenteritis, diarrhea, kidney and skin disease found very commonly in three districts namely Thatta, Badin, and Thar, due to poor drinking water quality in three districts namely Thatta, Badin, and Thar, are southern Sind Pakistan (3).

The reason behind this outbreak is the shortage of eminence of water testing laboratories and lack of legal agency for quality drinking water as well as presently at Pakistan there is no guidelines following the WHO recommendations for drinking water consequently this contaminated water becomes the basis of diarrhea, vomiting, gastroenteritis, dysentery, kidney problems etc at Thatta, Badin, Thar (5, 6, 7). Keeping

this observation in vision of this burning issue of health the antagonistic effect of contaminated water on human health becomes important to screen the concentration of this hazardous contaminant that polluted the drinking water.

#### **MATERIALS AND METHODS**

Water samples were collected randomly from the study area properly labeled and safely transported to Water testing & Surveillance laboratory for further analysis in ice box.

The following analysis was done:

- Turbidity through digital turbidity meter (PCCHECKIT, Germany).
- Electrical Conductivity (EC) Salinity, Total Dissolved Salts (TDS) and pH were measured with conductivity meter (Model no: sanso-direct con 200) (8, 9,10).
- The Arsenic was determined by Arsenic kit method MERCK with detection range 0.005mg/L to 0.5mg/L (11).
- The bacteriological investigation was measured for total coliforms count (TCC) and Total Faecal coliforms (TFC), by processing samples in a laminar flow hood using sterilized culture media moreover the bacterial study was assessed by Most Probable Number (MPN) technique as per

Standard Methods for the Examination of Water and Wastewater (12).

**RESULTS AND DISCUSSION:**

In present study the turbidity of 10 water samples of Tando Allhyaar was found < 5 NTU due to the ground nature and depth of boring, furthermore the turbidity of water samples was noted much higher than the permissible limits set by WHO. The samples were found with no color and odor the results were according to the WHO recommendations. Whereas as the Electric conductance (EC), Salinity, TDS (Total Dissolved Salts) and Chlorides of the ground water samples was found with higher values beyond the suggested limits. Total dissolved

solids (TDS) results were in the advised level for ground water for Matyari district water(11). Water samples of Chambar-naka, Fish market -1, Gandhi chowk, Mehran sugar mill, Mansoor colony, Khatri mohalla, Usmanabad town water were found arsenic in much higher concentration above  $10\mu\text{gL}^{-1}$  acclaimed by WHO (2011) shown in figure 03. The Presumptive coliform count per 100ml water method was used for bacteriological analysis, and results reveled that water samples was found with unacceptable grossly polluted shown in table 1, while the water samples from ground shows no growth of Coliform due of saline water and higher TDS level.

**Table 1: Phyco- chemical Analysis of drinking water of TandoAllhyaar dist. Sindh Pakistan**

Sampling Area	Source	Depth in feet	Color	Ph	Turbidity NTU	µs Sss	TDS mg/L	Salinity ppt	Chlorides mg/L	As mg/L	Presumptive coliform count per 100ml water
District Tando Allhyaar	Shahbaz colony,	MP	42'	C.L	7.57	< 5	2810	1.4	638	0.01	0
	Chambar-naka	MP	53'	C.L	7.80	< 5	2090	1.0	389	0.1	0
	Fish market -1	MP	76'	CL	7.77	< 5	1030	0.5	141	0.1	18+
	Fish market-2	WS		C.L	7.79	< 5	952	0.4	231	0.005	180+
	Fayaz colony	WS		C.L	7.80	< 5	943	0.4	211	0.005	180+
	KamaroosharifFayaz colony	WS		C.L	8.06	12	557	0.3	103	0.005	180+
	Pak colony	WS		C.L	8.00	08	796	0.4	180	0	180+
	Khatri Mohalla	WS		C.L	7.95	13	780	0.4	212	0	180+
	Jinnah Town	WS		C.L	7.08	17	829	0.4	193	0	180+
	KumbharMohalla	WS		CL	7.43	11	966	0.5	231	0	180+
	Sadia school Laal Danda	WS		C.L	7.48	14	795	0.4	211	0	180+
	Gandhi chowk	MP	45'	C.L	7.92	< 5	1640	0.8	268	0.1	0
	Mehran sugar mill	MP	45'	CL	6.92	< 5	1919	0.9	283	0.005	0
Mansoor colony	MP	53'	C.L	7.22	< 5	2369	1.1	299	0.01	0	
Khatri mohalla	MP	58'	CL	7.30	< 5	2502	1.4	331	0.025	0	
Usmanaba-d town	MP	65'	C.L	7.87	< 5	1679	1.090	0.8	263	0.025	0
WHO permissible limits			Color less	6.5 to 8.5	< 5	1500u S/cm	500 mg/L	02 to 0.5 ppt	250mg /L	0.01 mg/L	0

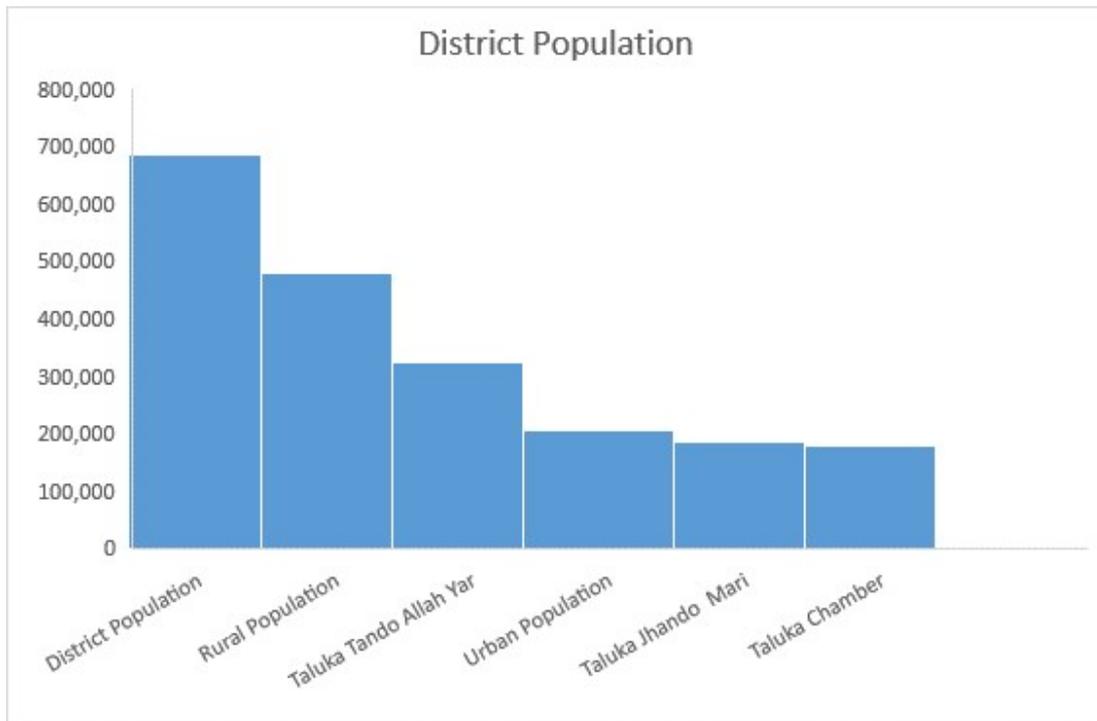


Figure 1: District Population of study Area

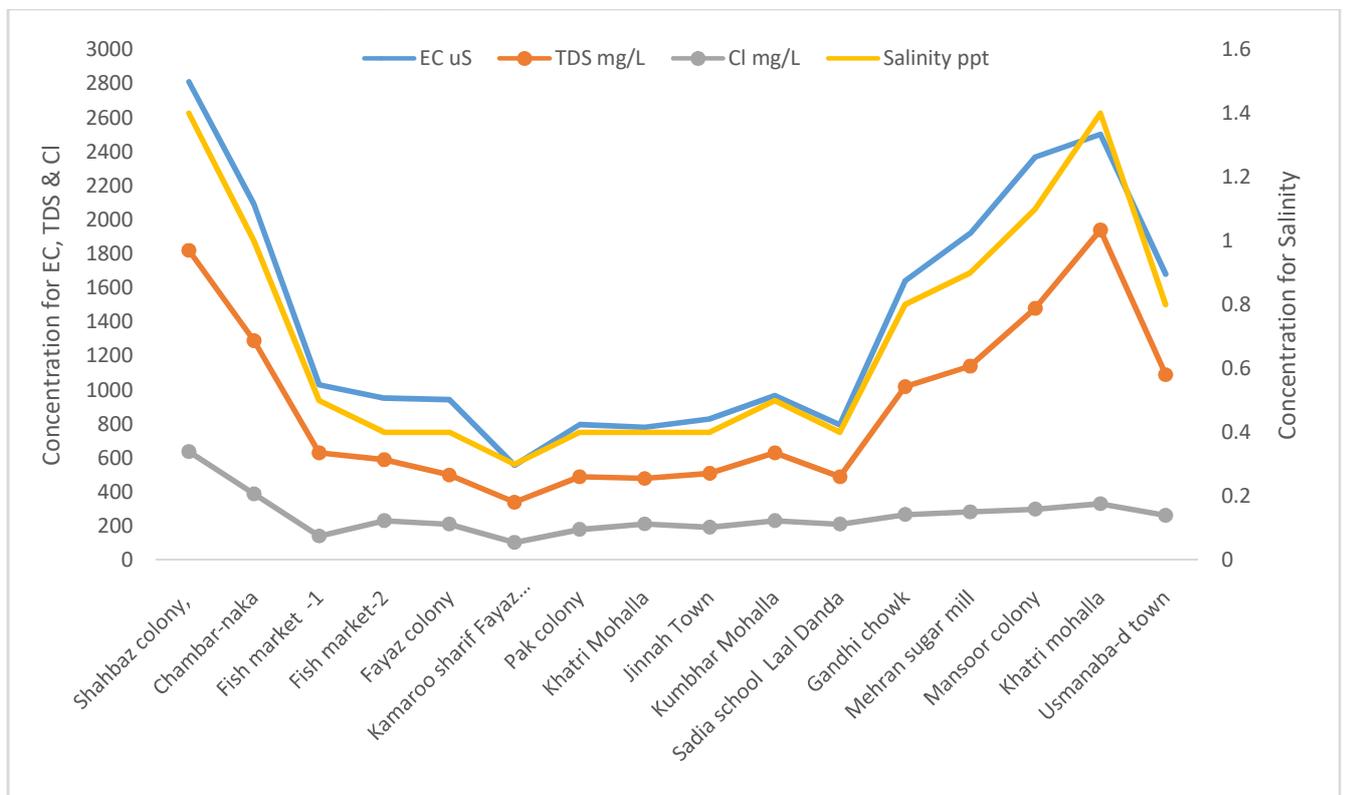
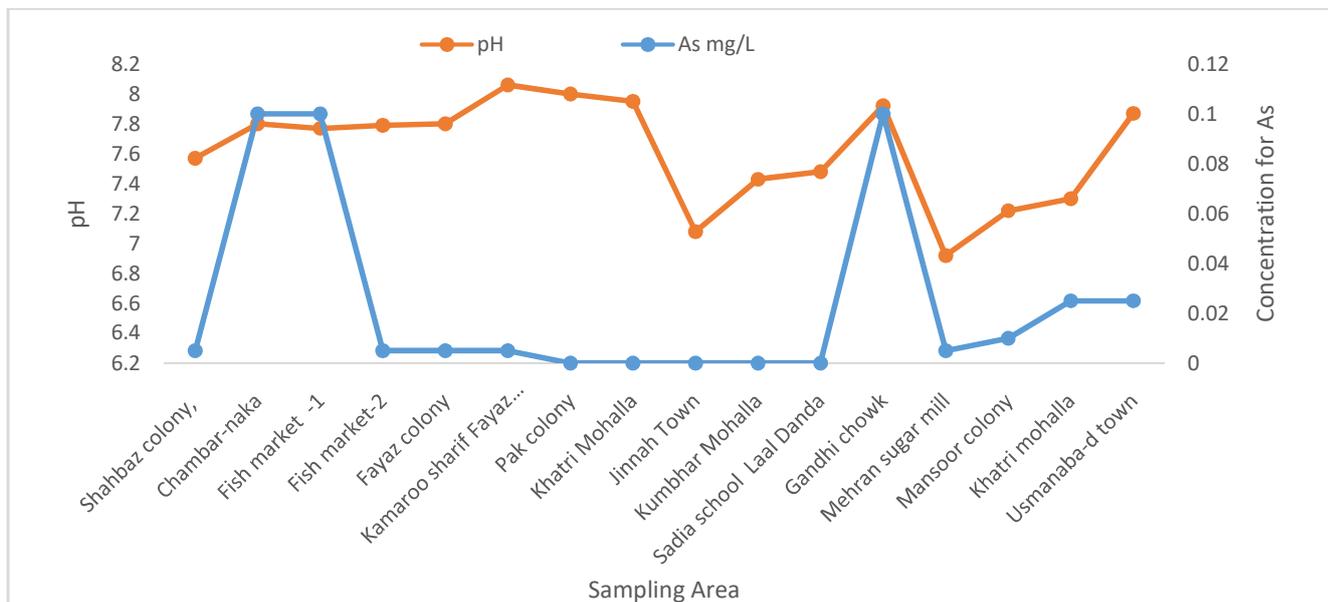


Figure 2: Concentration of ECT, TDS, Chloride and Salinity



**Figure 3: Concentration and pH value of drinking water**

**DISCUSSION**

Water being the vital source for living creatures therefore concern with many health implications and becomes focus of scientific community globally.

In Pakistan public health is at risk due to polluted drinking water with heavy metals and microorganisms around the country not only polluted human health but also affects the aquatic life (11). The present results for the physical parameters were show similarity with previous reported results for ground water (14). In drinking water the normal WHO level for turbidity is 5 NTU which is usually associated directly with higher levels of disease-causing microbes and indirectly constitutes many health issues (15).

The sample water shows more EC due to excessive dissolve solids and other impurities and the level was noted above the WHO limit (1562  $\mu\text{S}/\text{cm}$ ), results shows similarity with previous published data for drinking ground water of Bahawalpur City, Pakistan (16). TDS concentration was found in present study above the permissible value consecutively elevated TDS concentration make water unsuitable for human drinking purpose which affect skin and cause rashes, and disturb body hair as well, stiffness of the joints, kidney stones, gallstones, and hardening of arteries, decreases the tastiness and causes gastrointestinal irritations in human and laxative effect mainly upon transits, Presence of chloride in drinking water affects indirectly upon health by

corrosion of pipes which can elevate the metal level of water (17). Arsenic in drinking water of exceeding 10 ppb ( $\mu\text{g/L}$ ) of WHO limit, study led earlier reported that drinking water containing excess arsenic in eleven cities of Punjab (18), as arsenic in water foundations of nausea, vomiting, lower white and red blood cells production, damage blood vessels, disrupt the heart rhythm and cause uncomfortable tingling in hands and feet furthermore chronic exposure to arsenic become reason of many types of melanosis and cancer. The concentration of Arsenic (As) ranged amid 0.0045 to 0.0055 $\text{mgL}^{-1}$  equally in both seasons. Therefore chemicals and metals polluted the drinking water sources linked silently with many human ailments (19).

### CONCLUSION

It was concluded from the present research work that availability of microbial and arsenic contamination was found high in the drinking water above the WHO permissible limits which could be root of various health issues and let the public health at peak of risks.

### REFERENCES

- [1] Lui DHF, Liptak BG, Bouis PA (2000). Ground water and Surface water pollution, CRC Press. 126-34
- [2] Ahmad, E., and A. Sattar (2007) Awareness and the Demand of Safe Drinking Water Practices. Pakistan Institute of Development Economics, Islamabad. (Working Paper No. 21.)
- [3] Pakistan, Government of (n.d.) Medium Term Development Framework (2005–10) Ministry of Planning and Development, Islamabad.
- [4] Pandey, K., Sandeep, S. and Tiwari, S. (2009). "Nature and Science," 1, 7.
- [5] PCRWR. (2008b), "Arsenic Contamination in Ground Water of Central Sindh Phase I," Pakistan council for Research in Water Resources, PCRWR, Islamabad, Pakistan. 19.
- [6] Milovanovic, M. (2007). "Water quality assessment and determination of pollution sources along the Axios/Vardar River, Southeastern Europe," *Desalination* 213(1-3): 159-173.
- [7] Leghari, S.M., T.M. Jahangir, M.Y. Khuhawar, A.D. Rajper and A. Leghari(2002). Physicochemical and biological study of Gaj and Nalli of district Dadu, Sindh, Pakistan. *Biologia*, (48): 293-306.
- [8] Memon AH., A.B. Ghanghro, T.M. Jahangir and G.M. Lund (2016) Arsenic contamination in drinking water of

- district Jamshoro, Sindh, Pakistan. *Biomed Lett*, 2(1):31-37.
- [9] Rahman, A., and A.R. Khan (2000) Potable Water Quality Characteristics of the Urban Areas of Peshawar (Pakistan) Part 1: Tubewell Water. *J. Chem. Soc. Pak.*, (22): 171-177.
- [10] Solomons NW and M. Ruz (1998) Trace element requirements in humans: an update. *J Trace Elem Exp Med*, (11):177-95.
- [11] Uqaili AA, Mughal AH and B.K. Maheshwari (2012) Arsenic contamination in ground water sources of district Matiari, Sindh. *Int J Chem Environ Eng*,3(4):259-266.
- [12] PCRWR. (2008b), "Arsenic Contamination in Ground Water of Central Sindh Phase I," Pakistan council for Research in Water Resources, PCRWR, Islamabad, Pakistan. 19.
- [13] Oller AR., M.Costa and G.Oberdörster (1997). Carcinogenicity assessment of selected nickel compounds. *Toxicol Appl Pharmacol*,(143):152-166.
- [14] Wu B., D.Y. Zhao, H.Y. Jia, Y. Zhang, X.X. Zhang and S.P. Cheng (2009) Preliminary risk assessment of trace metal pollution in surface water from Yangtze River in Nanjing.
- [15] Alvi, S. K., Khan, F. A., Siddiqui, I., Asghar, U., and T.H.Usmani (2006). Trace Metals Contamination in Ground Water of SITE Industrial Area, Karachi. *J. Chem. Soc. Pak.*, (28): 223-229.
- [16] Khaiwal R. and V.K. Garg (2007) Hydro-chemical survey of groundwater of Hisar city and assessment of defluoridation methods used in India. *Environ Monit. Assess*, (132):33-43.
- [17] NSDWQ, (2008). "National standards for drinking water quality, Pakistan environmental protection agency, ministry of environment, government of Pakistan," 4-7.
- [18] Kahlown M., A. M. Hussain, M.Salam and H. Bhatti (2003). Impact assessment of sewerage and industrial effluents on water resources, soil, crops and human health in Faisalabad. Pakistan Council of Research in Water Resources, Islamabad.
- [19] Qureshi.S., G.M.Mastoi, A.B.Ghanghro and A.W. Mastoi, (2012). Impact of Sewage Water on Quality of Fullali Canal Water, Hyderabad, Sindh, Pakistan. *Energy, Environment and Sustainable Development*. Ed.Springer Wien NewYork : 191-193.