67. **EVALUATION OF WATER QUALITY, URINARY MERCURY & ARSENIC INVESTIGATION AND SURVEY OF DISEASES ASSOCIATED WITH DRINKING WATER SOURCES.**

Sayan Sarkar[1], Govind Mawari[2], Naresh Kumar[3], Mradul Kumar Daga[4], Mongjam Meghachandra Singh[5].

[1] Third-year Medical Student. Maulana Azad Medical College, New Delhi, India.

[2] MSc. Center for Occupational and Environmental Health, Maulana Azad Medical College, New Delhi, India.

[3] MD. Center for Occupational and Environmental Health, Maulana Azad Medical College, New Delhi, India.

[4] MD. Department of Internal Medicine and Infectious Diseases, Institute of Liver and Biliary Sciences, New Delhi, India.

[5] MD. Department of Community Medicine, Maulana Azad Medical College, New Delhi, India.

INTRODUCTION: Contamination of freshwater sources can be caused by both anthropogenic and natural processes. WHO reported that 1.1 billion people worldwide consume contaminated water, and the majority of diarrheal diseases (88%) are caused by it. According to Central Pollution Control Board (CPCB), Maharashtra along with two other states contribute 80% of hazardous waste, including heavy metal pollution in India. Certain dissolved heavy metals are easily absorbed by aquatic organisms and can enter the body through drinking water, skin absorption, and biological chains, posing a health risk. Hence, the main objectives of the study were, (1) surface and groundwater quality assessment, (2) to determine the association of diseases/symptoms with different sources of drinking water used, and (3) urinary Mercury (Hg) and Arsenic (As) levels investigation in the study population. **METHODS:** The cross-sectional study was conducted in the industrialized city of Solapur, Maharashtra, India. The study area was limited to 25 km around the industrial hub. A total of 557 people were randomly selected for the survey, with consumers from all four types of water sources i.e., surface, handpump, wells, and municipal water. Spot urine samples were collected for estimating Hg and As levels after considering inclusion and exclusion criteria. People under treatment for tuberculosis, cancer, and chronic heart, lung, or kidney ailments were excluded. Also, pregnant and lactating women were not included. One surface water, one municipal water, and five handpump water samples were collected for evaluating water quality. Samples were analyzed for pH, Total Dissolved Solids (TDS), Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Fluoride, Ammonia, Mercury, Arsenic, Cadmium, Lead, Nickel, Copper, Zinc, Chromium, and Manganese. **RESULTS**: The water samples were observed to be neutral to slightly basic. TDS was between 410 to 1898 mg/L for groundwater whereas for surface water was 378 & 450 mg/L. F concentration ranged between 0.4 to 0.9 mg/L, Zn from 0.32 to 0.57 mg/L, and NH3 was found to be <0.1 mg/L. Out of 557 people, 43 (7.7%) used surface water, 194 (34.8%) used handpump, 64 (11.5%) used well, and 256 (46%) used municipal water. Among surface water users, 14 (32.5%) people reported frequent loose stools (p-value <0.05), and 11 (25.5%) people reported frequent abdominal pain. Handpump and well water users majorly reported frequent abdominal pain and gastric discomfort (p-value <0.05) respectively. 47 people were selected for estimating urinary Hg and As levels after considering exclusion and inclusion criteria. The mean value of urinary Hg & As are 4.91 ± 0.280 & 42.04 ± 2.635 µg/L respectively. **CONCLUSION**: In our study frequent loose stools, abdominal pain, and gastric discomfort were associated with the various sources of drinking water. Urine Hg levels were above the permissible reference value set by NHANES (USA) Survey. Additionally, it is advised that frequent drinking water monitoring be implemented in the vicinity of the industrial hub since metal accumulation may be dangerous to consumers when it is present in excess, and if found higher, necessary action should be taken to reduce exposure.

Table. Water Quality Parameters.

Parameters	Groundwater		Municipal water		Surface water	
	Winter	Summer	Winter	Summer	Winter	Summer
pH	7.15 ± 0.08	7.35 ± 0.09	8.01	7.8	8.23	8.0
TDS (mg/L)	1366 ± 516	1137 ± 564	821	864	378	450
DO (mg/L)	3.8 ± 0.63	2.5 ± 0.9	4.5	3.7	6	4.4
COD (mg/L)	42.4 ± 39.6	30 ± 33	20	12	16	14
BOD (mg/L)	10.5 ± 7.9	4 ± 4	4	2.0	4	2.0
NH_3 (mg/L)	0.1	<0.1	0.1	<0.1	Nil	Nil
F (mg/L)	0.78 ± 0.15	0.86 ± 0.05	0.8	0.8	0.4	0.9
Hg (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
As (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cd (mg/L)	<0.003	<0.003	<0.003	<0.003	<0.01	<0.01
Pb (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05
Ni (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zn (mg/L)	<0.01	0.46 ± 0.09	<0.01	0.32	<0.01	<0.01
Mn (mg/L)	<0.01	<0.1	<0.01	<0.1	<0.01	<0.01
Cr (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Key words: Water quality; Public Health; Drinking Water; Heavy Metals; Cross-sectional Survey (Source: MeSH-NLM).