# ASSESSMENT OF WATER QUALITY OF JALAUN (U.P.) INDIA

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## ABSTRACT

The water samples from Jalaun, U.P., India were tested to assess the quality of ground water used for drinking during the period of investigation. The physico-chemical and bacteriological parameters were studied. The results obtained were compared with WHO/ICMR standard. The study area have high electrical conductivity (1.02 μs) and hardness (250 mg/l) at some places. Coliform count is very high (4000 MPN/100ml) at most sampling sites. These water cause various types of water borne diseases.

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## Introduction

Ground water is the major source of drinking water in Uttar Pradesh, India. Good quality of water is essential for health of living beings. Ground water is drawn by means of hand pumps, tube wells etc. and we pollute these sources of supply with our own excreta. Water polluted in this way can spread epidemic diseases such as cholera, typhoid and dysentery. During the last few years water pollution has increased instead of decreasing. Water becomes a killer when it becomes carrier of water borne diseases. About 80% of all diseases are water borne. WHO reports have pointed out that four out of five children suffer from water borne diseases. All over the world bacteriological diseases alone leads for 25000 deaths per day.

Drinking water may also contain harmful viruses or even radioactive isotopes. The kind of impurity depends entirely on the water supply and sewage disposal system as a whole.

## Materials and Methods

### Study area and climate

Water samples were collected from different Tehsils (*i.e.* A -Jaluan, B-Orai, C- Konch and D- Kalpi) region of District Jalaun (U.P.) situated at 25$^0$59' N latitude and 79$^0$37' E longitude and is about 141.6m above mean sea level. In general the climate is dry sub-humid typically monsoonic with extremes of temperature and well demarked into three distinct seasons viz. rainy (July to October), winter (November to February) and summer (March to

**TABLE-1 : Characteristics of potable water and its statistical analysis based on location A (Jalaun)**

| Parameter | Min | Max | Range | Mean | SD | SE | CV (%) |
|---|---|---|---|---|---|---|---|
| Conductivity (µs) | 0.47 | 1.02 | 0.55 | 0.59 | 0.1221 | 0.0273 | 20.69 |
| pH | 7.20 | 7.70 | 0.50 | 7.38 | 0.1267 | 0.0283 | 1.71 |
| Hardness (mg/l) | 100 | 250 | 150 | 132 | 35.03 | 7.83 | 26.53 |
| Coliform Bacteria (MPN/100ml) | 00 | 4000 | 4000 | 1725 | 993.06 | 222.16 | 57.56 |

**TABLE-2 : Characteristics of potable water and its statistical analysis based on location B (Orai)**

| Parameter | Min | Max | Range | Mean | SD | SE | CV (%) |
|---|---|---|---|---|---|---|---|
| Conductivity (µs) | 0.38 | 0.68 | 0.30 | 0.49 | 0.0712 | 0.0159 | 14.53 |
| pH | 7.20 | 7.44 | 0.24 | 7.32 | 0.0757 | 0.0169 | 1.03 |
| Hardness (mg/l) | 90 | 140 | 50 | 108.5 | 13.86 | 3.10 | 12.77 |
| Coliform Bacteria (MPN/100ml) | 00 | 4000 | 4000 | 950 | 1316.89 | 294.60 | 138.62 |

**TABLE-3 : Characteristics of potable water and its statistical analysis based on location C (Konch)**

| Parameter | Min | Max | Range | Mean | SD | SE | CV (%) |
|---|---|---|---|---|---|---|---|
| Conductivity (µs) | 0.34 | 0.59 | 0.25 | 0.51 | 0.0615 | 0.0137 | 12.05 |
| pH | 7.20 | 7.75 | 0.55 | 7.40 | 0.1293 | 0.0289 | 1.74 |
| Hardness (mg/l) | 100 | 150 | 50 | 121 | 15.52 | 3.47 | 12.82 |
| Coliform Bacteria (MPN/100ml) | 00 | 3000 | 3000 | 1108.3 | 1126.87 | 252.09 | 101.67 |

**TABLE-4 : Characteristics of potable water and its statistical analysis based on location D (Kalpi)**

| Parameter | Min | Max | Range | Mean | SD | SE | CV (%) |
|---|---|---|---|---|---|---|---|
| Conductivity (µs) | 0.40 | 0.73 | 0.33 | 0.52 | 0.1002 | 0.0224 | 19.26 |
| pH | 7.20 | 7.70 | 0.50 | 7.40 | 0.1132 | 0.0253 | 1.52 |
| Hardness (mg/l) | 100 | 160 | 60 | 121.5 | 16.94 | 3.78 | 13.94 |
| Coliform Bacteria (MPN/100ml) | 00 | 4000 | 4000 | 875 | 1638.08 | 366.46 | 187.21 |

**Note:** A-D Locations are present in Jaluan district, 20 samples are collected from each location.

June). The average annual rainfall is about 1012.3 mm of which more than 80% falls between July to October. The average annual temperature is uniformly high ($25^0$C) but the mean monthly values very considerably ($13.8^0$C mean minimum to $34.3^0$C mean maximum).

The investigation were made in pre-monsoon (April-May, 2014), monsoon (July-August, 2014) and post-monsoon (November-January, 2014-15) of the year 2014-15. The bottles used for collection of water samples were made up of Pyrex glass and were cleaned by boiling them in dilute $HNO_3$ followed by distilled water[2]. The characteristics like pH, conductivity and hardness were measured as early possible after sampling.

pH of the samples were determined by Equip-Tronics digital pH-Merter model EQ-610 using glass electrode. Specific conductance was measured by Equip-Tronics digital Conductivity Meter model No. EQ-660 A which is first calibrated by using standard KCl solution. Total hardness ($Ca^{++} + Mg^{++}$) in the water samples was determined by titration with standard EDTA[5]. Bacteriological analysis of water was done following the standard method[1,9].

## Results and Discussion

Conductivity of water was recorded during the period of investigation, its maximum and minimum values have been presented (Tables 1-4). Wide range of variations were found during the period of investigation. Many workers[4,7] found similar trend of observation. The maximum (7.75) and minimum (7.20) values of pH are presented. A similar value of pH was also reported by other workers[3,4]. Maximum (250 mg/l) and minimum (90 mg/l) values of total hardness are presented (Tables 1-4). A similar trend of was also found by previous workers[3].

The density of coliform group is the criteria for the degree of contamination and has been the basis for bacteriological water quality standard. The coliform numbers varied form 0/L to 4000/L and 0/L to 3000/L as shown (Tables 1-4). The drinking water standard recommended by ICMR for coliform group is 1/100 ml. Hence water samples were contaminated with coliform group.

## Conclusion

The results obtained in the present study from different sampling locations of Jalaun indicate higher values of electrical conductivity. Hardness of water registered wide range of variation. During the period of investigation, it was observed that water is moderately hard for most part of the study. However, in case of micro-biological parameter higher values of coliform bacteria indicate faecal contamination. Municipal water supplies were found to be contaminated with coliform bacteria. So municipal water was not fit directly for human consumption.

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