

STUDY OF GROUND WATER QUALITY OF KHARGONE TOWN (M.P.) AND ITS IMPACT ON HUMAN HELTH

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ABSTRACT: *Water is fundamental for life and health. The human right to water is indispensable for leading a healthy life in human dignity. The Earth is full of natural resource needed for the development of mankind. The ground water is not always suitable for drinking and other purpose. Generally the ground water is considered least polluted as compared to surface water. The turbidity, pH, TDS, specific conductivity, total alkalinity, hardness, chloride, fluoride, nitrate, sulphate, dissolved oxygen and bacteriological conditions were detected. A large population of Khargone Town is using ground water for drinking purpose. There for some of the water samples are not suitable for drinking purpose and they affected the health suitable for drinking purpose and they affected the health status also.*

Key Words: *Drinking purpose, faecal colifoms, physico-chemical, well, tube well, Hand pump, ground water*

Introduction :- Water is a prerequisite to the realization of all other human rights. Water plays an essential role in human life. Water is the most precious and important natural resources on the earth. Water is used for drinking, bathing and washing and many other purpose like irrigation and industries. Due to human activities this natural sources having fast depletion. Human and ecological use of ground water depends upon ambient water quality (Neelima bagde, 2016). Generally the ground water resources are considered least polluted as compared to the other natural resources. A large population of khargone town is using ground water for drinking purposes. The pollution of ground water system from organic and inorganic substances makes it unsafe for drinking (Dhakad and Choudhary 2004).

This study is to know the ground water quality and its suitability for drinking and domestic purposes at khargone town, M.P. for this object 6 ground water sampling station were monitored during 2008 seasonally.

Material and Methods

Study Area: khargone town was selected for the present study.

Location : Khargone is district place of Madhya Pradesh. It is located in the western region of the state M.P..

Sampling Stations:

The 6 sampling stations were selected randomly in different areas of khargone town. Which cover all the direction of the town, these sampling stations are combination of 2 hand pump, 2 tube well and 2 open well. All the sampling stations were monitored seasonally. Detail of sampling stations is as under:-

- (a) **Hand Pumps:** (i) Nutan Nagar (ii) BTI Colony.
- (b) **Wells:** (i) Brijvihar Colony (ii) Krishi upaj mandi.
- (c) **Tube Wells:** (i) Gouridham (ii) Jyoti nagar.

Collection, Observation:

Water sample from these stations were collected and testing was done as per the standard methods described by APHA (1992). The data was collected seasonally i.e- Rainy, winter and summer.

Table: 1- Desirable limit of Drinking water of BIS

| S.No. | Parameters | Standard limit |
|-------|--------------|----------------|
| 1 | Colour | - |
| 2 | Turbidity | 5 NTU |
| 3 | pH | 6.5-8.8 |
| 4 | Conductivity | - |
| 5 | TDS | 500 |

| | | |
|----|------------------|----------------|
| 6 | Total Hardness | 300 |
| 7 | Total Alkalinity | 120 |
| 8 | Chloride | 250 |
| 9 | Fluoride | 1.5 |
| 10 | Nitrate | 45 |
| 11 | Sulphate | 150 |
| 12 | Total Coliforms | 0 (Per 100 ml) |
| 13 | Faecal Coliforms | 0 (Per 100 ml) |

RESULT AND DISCUSSION:

The result of physic-chemical characteristics of water is represented in table (2 to 4).

It is an established fact that maintenance of healthy aquatic system depends on physico-chemical properties of water and biological diversity. The colour of the hand pumps, tube wells and wells water was true in all three seasons.

The turbidity values of all hand pumps and tube wells water sample were under the desirable limit and well water turbidity was higher. Disposal of solid wastes near the wells was observed. Due to which water gets contaminated and the resulted in high turbidity value.

The pH values of all ground water samples were 6.4 to 7.9. Its under the permissible limit of BIS. Some ground water sample of the present finding show higher values of specific conductivity in summer season. This might be due evaporation and increase in dissolved contents. During rainy season dilution of water resulted in lower the specific conductivity values.

TDS values was 185 to 388mg/l. It is arrangement with the study of Krishnan G. *et al.* (2016). The TDS values of all ground water samples were higher during summer season. The necessary treatment of this ground water sample is a must for producing suitability for drinking purpose as for as TDS value or concerned.

The hardness values of all ground water samples were under the desirable limit according to WHO (1985). For drinking purpose hard water is always considered much better than the soft water. Hardness can slightly removed by boiling the water. The alkalinity was under the permissible limit of BIS.

The chloride level of Nutan nagar hand pump was slightly higher than other ground water samples. It may be also due to chlorination treatment of water and disposed of refuse dump near this hand pump. Other ground water samples (well, tube-well and hand-pump) was results obtained under the maximum desirable limit. So, these type of water can be used for drinking and domestic purpose.

Table: 2- Physic-chemical characteristics of water of Hand Pumps - 2008

| S.N. | Parameters | (i) Nutan Nagar | | | (ii) BTI Colony | | |
|------|----------------------------------|-----------------|--------|--------|-----------------|--------|--------|
| | | Rainy | Winter | Summer | Rainy | Winter | Summer |
| 1 | Colour | T.C. | T.C. | Dried | T.C. | T.C. | Dried |
| 2 | Turbidity | 1.8 | 2.5 | Dried | 1.6 | 1.25 | Dried |
| 3 | pH | 7.8 | 6.6 | Dried | 7.8 | 6.6 | Dried |
| 4 | SP. Conductivity | 431 | 522 | Dried | 419 | 591 | Dried |
| 5 | TDS | 370 | 256 | Dried | 197 | 185 | Dried |
| 6 | Total Hardness | 282 | 309 | Dried | 232 | 288 | Dried |
| 7 | Total Alkalinity | 404 | 302 | Dried | 228 | 259 | Dried |
| 8 | Chloride | 208 | 222 | Dried | 142 | 152 | Dried |
| 9 | Fluoride | 0.03 | 0.02 | Dried | 0.02 | 0.01 | Dried |
| 10 | Nitrate | 28.0 | 24.0 | Dried | 24.0 | 16.8 | Dried |
| 11 | Sulphate | 20.0 | 18.0 | Dried | 29.0 | 26.0 | Dried |
| 12 | Total Coliforms (Per 100 ml) | NIL | NIL | Dried | NIL | NIL | Dried |
| 13 | Faecal Coliforms (Per 100 ml) | NIL | NIL | Dried | NIL | NIL | Dried |

T.C.= True Colour

Table:3- Physic-chemical characteristics of water of Wells - 2008

| S.N. | Parameters | (i) Brijvihar Colony | | | (ii) Krishiupaj Mandi | | |
|------|--------------------------------------|----------------------|--------|--------|-----------------------|--------|--------|
| | | Rainy | Winter | Summer | Rainy | Winter | Summer |
| 1 | Colour | T.C. | T.C. | T.C. | T.C. | T.C. | T.C. |
| 2 | Turbidity | 6.1 | 4.8 | 3.3 | 4.9 | 3.7 | 2.7 |
| 3 | pH | 7.5 | 6.4 | 6.7 | 7.8 | 7.0 | 6.8 |
| 4 | SP. Conductivity | 363 | 492 | 407 | 362 | 470 | 488 |
| 5 | TDS | 244 | 364 | 373 | 297 | 290 | 312 |
| 6 | Total Hardness | 145 | 161 | 170 | 208 | 231 | 247 |
| 7 | Total Alkalinity | 287 | 199 | 216 | 184 | 218 | 226 |
| 8 | Chloride | 149 | 161 | 174 | 188 | 208 | 212 |
| 9 | Fluoride | NIL | NIL | NIL | NIL | NIL | NIL |
| 10 | Nitrate | 18.2 | 20.2 | 22.6 | 14.0 | 19.0 | 21.0 |
| 11 | Sulphate | 49.0 | 41.0 | 34.0 | 39.0 | 40.0 | 25.0 |
| 12 | Total Coliforms (Per 100 ml) | NIL | NIL | NIL | NIL | NIL | NIL |
| 13 | Faecal Coliforms (Per 100 ml) | NIL | NIL | NIL | NIL | NIL | NIL |

T.C.= True Colour

Table: 4- Physic-chemical characteristics of water of Tube Wells - 2008

| S.N. | Parameters | (i) Gouridham | | | (ii) Jyotnagar | | |
|------|--------------------------------------|---------------|--------|--------|----------------|--------|--------|
| | | Rainy | Winter | Summer | Rainy | Winter | Summer |
| 1 | Colour | T.C. | T.C. | T.C. | T.C. | T.C. | T.C. |
| 2 | Turbidity | 1.8 | 1.12 | 1.14 | 1.5 | 1.3 | Dried |
| 3 | pH | 7.9 | 7.1 | 6.6 | 7.9 | 7.2 | Dried |
| 4 | SP. Conductivity | 499 | 571 | 682 | 645 | 759 | Dried |
| 5 | TDS | 350 | 380 | 388 | 368 | 371 | Dried |
| 6 | Total Hardness | 312 | 352 | 391 | 121 | 178 | Dried |
| 7 | Total Alkalinity | 109 | 133 | 181 | 203 | 220 | Dried |
| 8 | Chloride | 227 | 234 | 258 | 133 | 192 | Dried |
| 9 | Fluoride | NIL | NIL | NIL | 0.02 | 0.01 | Dried |
| 10 | Nitrate | 20.0 | 19.1 | 18.3 | 11.9 | 13.0 | Dried |
| 11 | Sulphate | 59.0 | 51.0 | 41.0 | 55.0 | 46.0 | Dried |
| 12 | Total Coliforms (Per 100 ml) | NIL | NIL | NIL | NIL | NIL | Dried |
| 13 | Faecal Coliforms (Per 100 ml) | NIL | NIL | NIL | NIL | NIL | Dried |

T.C.= True Colour

Fluoride content of all the ground water samples of present study was under the desirable limit of BIS. It is in agreement with the study of Dhakad and choudhary (2004). If it cross the limit (1.5gm/l.) of BIS may cause fluorosis diseases.

Nitrate and sulphate content of all the ground water samples of recent study was under the maximum desirable limit of BIS. It's safe for drinking and domestic purpose. If nitrate found above 45 mg may cause methemoglobinemia. Nitrate which may be due to large addition of decayed vegetable and animal matter, sewage sludge, domestic effluents disposal to land leachates from refuse dump and atmospheric washout. Similar findings were recorded by **Ravinder et al. (2005)**.

Total coliforms and Faecal coliforms were not found in the all ground water samples.

Suitability of The Ground Water Samples:

1. The present study indicate the higher values of some parameters in most of this sample. Which is not suitable for drinking but, after the treatment including coagulation, sedimentation, filtration and remove naturally present impurities and its suitability for drinking and domestic purpose.
2. Well water samples having highest values of some parameters. It is suggested that these water cannot be used for drinking and domestic purpose they can create health problems.
3. Higher contaminated water is create the various water related and water born diseases. Known as diarrheas, cholere, gastroenteritis and other diseases.
4. All ground water samples are suitable for irrigation, bathing and washing.
5. Should be control the dispatch of waste & garbage surrounding resources.

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