Review Article

Physico-Chemical Analysis of Drinking Water with Special Reference to Chindwara District (M.P.)

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ABSTRACT

As opposed to groundwater, drinking water from tube wells is fresh and free from contaminants. Human health and welfare are significantly impacted by water use. In poorer countries, where poor sanitation and the use of contaminated water cause 80 percent of disease cases. The quality of drinking water has always been a major health concern. The main health concern in the majority of developing countries is that a substantial portion of the population in rural communities lacks access to drinkable water. In this article, physico-chemical analysis of drinking water with special reference to Chindwara District (M.P.) has been evaluated.

Keywords: Physico-Chemical, Drinking Water, Chindwara District

INTRODUCTION:

In order to ensure the right quality and quantity of water for these purpose it is extremely important to monitor water supply throughout taking all the aspect into consideration [1]. The various factors which are to be considered for supply of the water for any purpose are:

➢ The quantity of the water available

➢ Seasonal variation in quantity as well as quality

➢ Analysis of water taking in to consideration its chemical, physical, microscopically and bacteriological characteristics

➢ Influence of industrial wastes, sewages etc. on the quality of water.

➢ Cost involved in getting continuous supply of required quality and quantity of water.

Objectives of the Study:

➢ To estimate the quality of underground water of some representative areas of four tehsils such as Chaurai, Tamia, Harrai and Parasia of Chindwara district.

Ramesh Kumar Pahade [1] , Dr. Neelu Jain [2]

➢ To characterized the different types of water in terms of pH, hardness, total alkalinity, fluoride, phosphate, chloride, calcium, magnesium, and nitrate values, COD, BOD, total alkalinity, temperature, pH, dissolved oxygen (DO), total dissolved solid (TDS) etc.

➢ To establish inter-relationship between different parameters of same region in terms of three seasons such as winter, monsoon and summer.

RESEARCH METHODOLOGY AND DATA ANALYSIS:

As the rainfall is uneven from past few years, the potential of small/seasonal rivers affect the ground water in different ways [2]. This can make a large change in property of ground water which could be temporary or permanent and hence the quality of ground water decreases [3].

Ground water system is polluted by natural activities as well as human activities such as: Pollutants dumped on the surface of land comes in contact with percolating water of rain which make the soluble part dissolve in them and picks it up to the aquifer contaminates and arrangement the superficial water [4]. The boisterous of surface water pollution in various level of the nation has developed so severe that if crucial ladders for reduction are occupied, surface water capitals may be injured [5].

Ground water property depends on number of factors such as:

1. Numbers of hydrological factors: Variation in seasons

2. Numbers of physical factors: Type of soil, moisture content etc.

3. Numbers of chemical factors: Soil pollution by industry, constitution of upper crust of soil

4. Numbers of biological factors: Surrounding plant kingdom and animal kingdom.

It is generally found that the groundwater contains more dissolved constituents compare to surface water as it comes more in contact with different types of material than surface water. As the constitution of soil varies from point to point, there is a vast difference in constitution of ground water. Potable water should ideally be free from toxic elements, dissolved minerals in specific limit; some heavy metals in specific limit for example cobalt, copper etc. The foremost serious problem is increase in fluoride content in ground water leading to 'Fluorosis" disease. In most of the cases ground water is used as a major source of drinking water hence it is necessary to know that what amount of dissolved/suspended constituents are present in ground water. So the water analysis of four rural talukas of the selected district with 15 stations in each Taluka in three different seasons is performed.

Selected Four Tehsils for Research: Chaurai, Tamia, Harrai and Parasia
Chaurai (Selected Station): Amajhiri**,** Badiwara**,** Chand**,** Dungaria**,** Ghorawadi**,** Hiwarkhedi**,** Jhilmili**,** Kapurdda**,** Lohara**,** Machaghora**,** Naulajhir**,** Pachgaon**,** Rampuri**,** Samaswada**,** Udadon
Tamia (Selected Station): Anhoni, Bamdi, Chauradongri, Delakhari, Gonawadi, Hirripathar, Itawa, Jhirpa, Kajra**,** Lotiya**,** Mordhana, Nagri, Pandupipariya, Sajkuhi, Umarbah
Harrai (Selected Station):
Andol, Bargi, Chaurasi, Dendu, Gaorpani, Hadai, Jamuniya, Karapatha, Lohajhiri, Manakwadi, Nachna, Ojhaldhana, Rajadhana, Sukhapura, Unchakheda
Parasia (Selected Station): Bagbardhiya, Chhinda, Damua, Ghaliwada**,** Harrai**,** Jatachhapar, Kohka**,** Likhawadi**,** Mandla**,** Pagara, Rawanwada**,** Suthiya**,** Thesgora**,** Toomdi**,** Urdhan

For each station in different Tehsils of Chindwara district some point was selected for collecting the sample of ground water in three different seasons of the year i.e. May 2020 (Summer), August 2020 (Monsoon) and January 2021 (Winter) & were analyzed to determine TDS, pH, Total Hardness, Ca^{2+}, Mg^{2+}, Cl^-, SO_4^{2-}, NO_3^-, F^-, alkalinity,

turbidity, EC, DO, COD, BOD, temperature. Water sample were collected from hand pump/ tube-wells/ bore-wells/ open dug wells used for drinking and/or irrigation. Water sample from hand pump/ tube-wells/ bore-wells were collected directly in precleaned 2.5 L glass sample bottle after running the water for five minutes. Whereas the samples from open dug wells were directly collected in pre-cleaned 2.5 L glass sample bottle. Samples were analyzed immediately for the BOD, COD, temperature and turbidity, after that taken to laboratory and were analyzed.

Table 1: Techniques used in the water analysis

Sr.No.	Parameters of water analysis	Methods
1	Temperature	Thermometric
2	pH	Digital pH Meter
3	Ca^{2+} Hardness	Titration (EDTA-Titrimetric)
4	Mg^{2+} Hardness	Titration (EDTA-Titrimetric)
5	TDS	Digital TDS Meter
6	Total Alkalinity	Titrimetric using Indicators
7	Chloride	Argenometric
8	Phosphate	Spectrophotometric
9	Sulphate	Spectrophotometric
10	Nitrate	Spectrophotometric
11	Dissolve Oxygen	Titratomatric
12	COD	Open reflux method
13	F^-	Spectrophotometer

CONCLUSION:

After interpretation of data, the conclusion of the research are in the following:

➢ Quality of drinking water is not good as much as required.

➢ Physicochemical parameters of water are scope to analyze in this area.

➢ People facing problems like cancers, paralysis, neurological, disorder, nerve damage, thyroid problems, liver damage, kidney problems, cardio-vascular disorder finger nail loss, diarrhea, hair loss, mottle teeth, lung irritation due to drinking poor quality water so it creates scope for proper research to check quality of water.

➢ Investigation of physic-chemical analysis of ground, surface water etc. of Chindwara district, M.P like concentration of ions phosphate, chlorides, calcium, magnesium and nitrate values, COD, BOD, total alkalinity, temperature, pH, dissolved oxygen (DO) total dissolved solid (TDS).

➢ All the parameters were measured in terms of WINTER, SUMMER and MONSOON seasons.

➢ All data were compared with standard data and our target is to make peoples of these regions are aware about quality of water they are using and do need base work to improve quality if it is required.

Ramesh Kumar Pahade [1] , Dr. Neelu Jain [2]

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