



**ORIGINAL ARTICLE**

**Nitrate in Groundwater of Neemkathana Block Sikar, (Rajasthan) India**

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**ABSTRACT**

*This paper observes comparative analyses and describes the groundwater nitrate level of Neemkathana Block. Seven villages (Ganeshwar, Khadra, Mandoli, Sirohi, Chala, Heeranagar, and Bhudoli) have been selected for sampling for groundwater testing and monitoring. The sampling method is selected as per BIS and WHO. Nitrate is within the BIS (IS10500:2012) acceptable limit of 45 mg/L in Groundwater Mandoli, Sirohi, and Chala villages, while the limit is exceeded in four villages Ganeshwar, Khadra, Heeranagar, and Bhudoli. The groundwater of Khadra village has highly deteriorated. Anthropogenic and geogenic activities are continuously affecting to quality of groundwater.*

**Key words:** Groundwater, physio-chemical parameters, Nitrate, BIS, permissible limit, WHO

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**INTRODUCTION**

According to a Ministry of Consumer Affairs, Food & Public Distribution 2016 Parliament committee report on water resources, nine states - in south, west and central India-groundwater levels are now described as "critical". Aiming to ensure that clean and safe drinking water is provided to all, the Department of Consumer Affairs decided to undertake a study through the Bureau of India Standards (BIS). Freshwaters are required for domestic, agricultural, industrial, and commercial purposes, and for human existence, adequate quality and quantity are required (Kumar, 1997). According to Sargaonkar and Deshpande (2003) work of assessment of water quality and pollution control is conducted by different National and International Agencies for various uses of water, for this purpose they are considering different indicator parameters. These classification schemes differ in terminologies used like Action level/ Guide level for the determination of water quality standards. High concentrations of nitrate in groundwater in arid, and semi-arid areas are due to agricultural activities, natural vegetation by leguminous species, like acacias, and leaking effluent due to site sanitation (WHO, 2007). World Health Organization (2007) stated that "High nitrate concentrations can cause Methemoglobinemia (blue-baby syndrome) in bottle-fed infants. This condition is also associated with the simultaneous presence of bacterial contamination. Agarwal (2015) assessed nitrate contaminations in the groundwater of Jaipur district, Rajasthan, and its impact on human health and said about the sources of nitrate in groundwater which are geological or man-made. Parvizishad *et al.* (2017) give to review the adverse effects and benefits of nitrate and nitrite in drinking water and food on human health. Low

concentrations of nitrite and nitrate could have a protective effect on the cardiovascular system, blood pressure regulation and maintaining homeostasis of vessels. Neemkathana block of Sikar district is semi-arid in nature with low annual rainfall, this block is rich in minerals due to the large area of sedimentary and metamorphic rocks, a part of Aravalli hills (CGWB 2013). Mining activities of stone and sand are going on at a huge level in a major part of the Neemkathana block as Over 400 open-cast mines of rock minerals are running and a large-scale sand mining is also running. As mining of rock needs a large number of explosive materials which are itself hazardous to health, and mining activities are going on below the water table. Fine particles and explosives at mining sites continuously enter into the aquifer system with groundwater recharging and runoff up to the nearby surface-water reservoir. Shallow aquifer quality is more affected by the increased mining activities. Some rural areas of the block are highly irrigated. Use of fertilizers, improper collection of animal manure, and agricultural runoff becoming major causes for the deterioration of the limited water resources.

### GEOGRAPHIC LOCATION

The latitude of Neemkathana, Rajasthan, India is 27.738001 and the longitude is 75.782997. Neemkathana, Rajasthan, India is located at *India* country in the *Towns* place category with the gps coordinates of 27° 44' 16.8036" N and 75° 46' 58.7892" E. The mean annual rainfall is highest (536.6 mm) at block and hydrological formation is older alluvium and quartzite. The principal aquifer in the area is quaternary sediments.

### RESULT AND DATA ANALYSIS

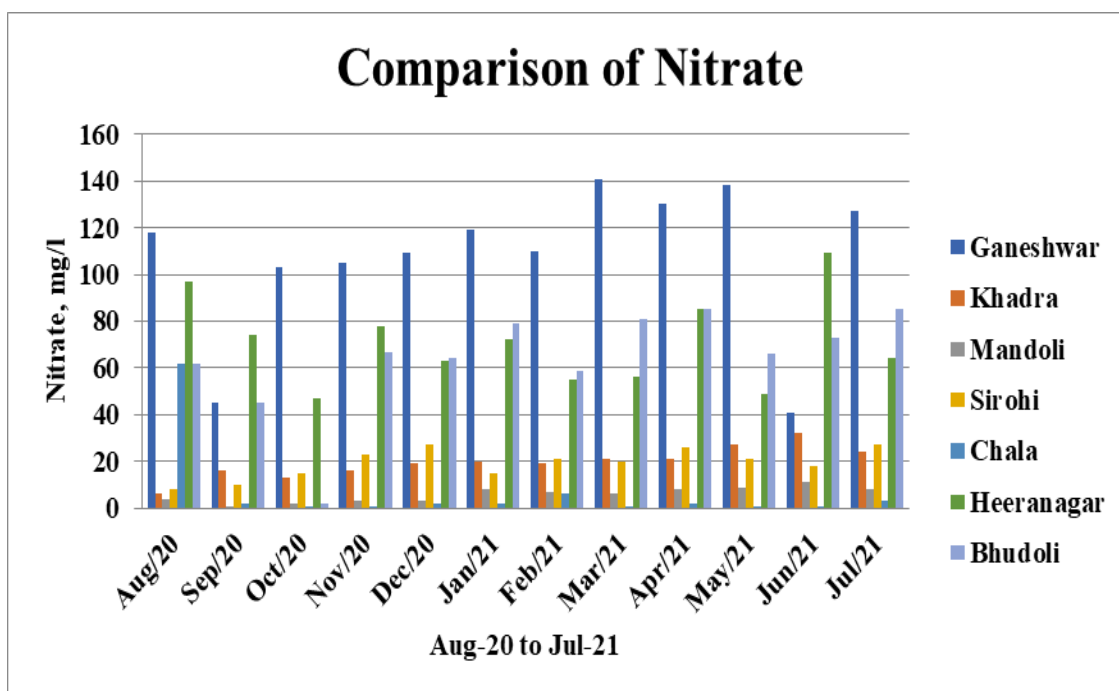
#### Assessment of nitrate in groundwater of Neemkathana block:

Groundwater samples analysed for nitrate (mg/L). Test results for the assessment period for the selected block are-

**Table 1:** Nitrate in groundwater of Neemkathana block

Village Months	Ganeshwar	Khadra	Mandoli	Sirohi	Chala	Heeranagar	Bhudoli	Mini	Max
	Aug-20	118	175	4	8	2	97	62	2
Sep-20	45	194	1	10	2	74	45	1	194
Oct-20	103	206	2	15	1	47	2	1	206
Nov-20	105	221	3	23	1	78	67	1	221
Dec-20	109	224	3	27	2	63	64	2	224
Jan-21	119	266	8	15	2	72	79	2	266
Feb-21	110	237	7	21	6	55	59	6	237
Mar-21	141	260	6	20	1	56	81	1	260
Apr-21	130	271	8	26	2	85	85	2	271
May-21	138	243	9	21	1	49	66	1	243
Jun-21	107	229	11	18	1	77	73	1	229
Jul-21	127	247	8	27	3	64	85	3	247

The table 1 and figure 1 shows that for the assessment period from Aug-20 to Jul-21 nitrate in the groundwater of the Neemkathana block shows variation. Nitrate is within the BIS (IS10500:2012) acceptable limit of 45 mg/L in Groundwater Mandoli, Sirohi, and Chala villages, while limit is exceeded in four villages Ganeshwar, Khadra, Heeranagar, and Bhudoli. Nitrate in the groundwater of Khadra village is comparatively higher.



**Fig. 1:** Nitrate in groundwater in Neemkathana block

## CONCLUSION

Assessment results for the nitrate parameters are at an alarming level for the selected block. In particular, the protection of wells from runoff from fields and siting of manure stores, pit latrines, and septic tanks will help to prevent contamination with nitrate and microbial pathogens. Anthropogenic and geogenic factors continuously deteriorate the groundwater quality of the selected block, so a large-scale study is required for the Neemkathana block.

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