OPEN ACCESS

Int. Res. J. of Science & Engineering, 2019; Vol. 7 (2): 51-54 http://www.irjse.in
ISSN: 2322-0015

ORIGINAL ARTICLE

Study concentration of nitrate in drinking water sample

Tamlurkar HL *(Ph.D.)*

P.G. and Zoology Department, Yeshwant Mahavidyalaya, Nanded, MS, India

Manuscript Details

Received: 12.03.2019
Accepted: 20.04.2019
Published: 30.4.2019

ISSN: 2322-0015

Cite this article as:
Tamlurkar HL. To study concentration of nitrate in drinking water sample, *Int. Res. Journal of Science & Engineering*, 2019, 7 (2): 51-54.

ABSTRACT

Water is an important natural resource for all kinds of life and environment bur over the last few decades the water quality has been deteriorated due to its over exploitation. In rural as well as in urban areas ground water is the major source for drinking purpose. Ground water is gift of nature and about 94% of the drinking water is available from ground water. A number of chemical compounds are found in ground water and one of them is nitrate. Drinking water contaminated by nitrate is more commonly associated with some form of pollution made by human activities. Nitrates are very soluble in water and more easily through soil. Over time nitrate can accumulate in ground water that may then use for drinking purpose. When nitrogenous waste in soil or in water is decomposed by microbial action then nitrate is formed. Vegetable matter, human waste discharge and animal slurries are natural source of nitrate. A review is studied in the present paper that focuses on concentration of nitrate in drinking water. The aim of the paper is to study the review on the effect of the nitrate contaminated water on human being.

Keywords': Nitrate, Drinking water and methemoglobinemia.

1. INTRODUCTION

Nitrate in ground water is a feature found in many region and a significant part of the world population used water with nitrate level excess of the world health organisation (WHO)[1] maximum drinking water standard the WHO stated that evidence is accumulating that nitrate levels in many aquifers are increasing and that the problem of the world population to high nitrate inputs will become more pressing particularly in the developing nations[2]. The increasing nitrate levels were recently demonstrated by a hydro geological study at Ramotsava near Gaborone in Botswana [3]. In 2002, Farshad and Immandale reported that nitrate and nitrite concentration in water resources among 300 large complexes located in the outskirts of Teheran where 51.96 mg/L and 5.9 mg /L respectively and they were both considered to be above WHO specified limit and the safety standards established by national guidelines.

Both regionally and nationally, concern about nitrate contamination has prompt number of studies dealing with the relationship between agricultural and nitrate contamination of ground water [4,5,6]. A statistical study of farmstead well found that nitrate was the most common source of inorganic contamination exceeding the maximum contaminant level [MCL] in 28 % of the wells [7,8] estimate that 60% of families living rural areas and 23 % living in urban areas of developing countries are without safe water. A more recent estimate by pure water of the world state that 1200 million people in developing countries do not have access of safe water and that 25 million people die each year through diseases contracted by contaminated water (Pure water for the world 2000)[1,2]. Humans have altered the nitrogen cycle dramatically over the last half century and as a result, nitrate is steadily accumulating in our water resources. Globally, Human nitrogen production has increased rapidly since 1950 & currently and exceeds nitrogen fixed by natural sources by about 30 % [9]. This figure compares with pre 1950 human inputs, which were a small fraction of the input from natural resources [10].

2. EXPERIMENTATION

Sarangpur Dam: The project envisages construction of an earthen dam across river Saragpur, near Nizamabad district of Telangana.

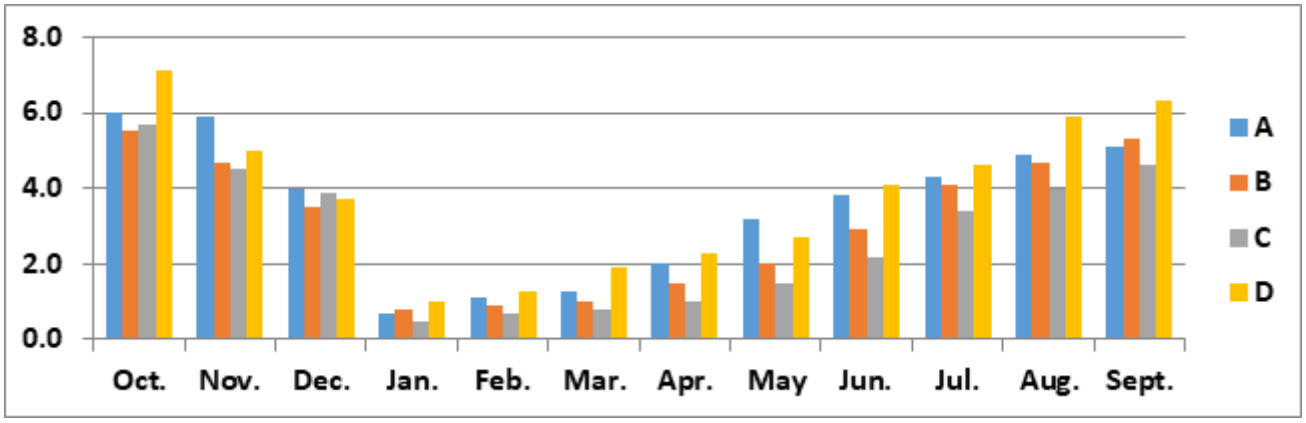
Sample collection: The present investigation monthly water samples were collected from October till September during 2012 ~ 2015 from the four different sampling sites – Station A, B, C, & D, between 10:00 AM ~ 11:00 AM. Station A & Station B are present in the South ~ East direction of water bodies (1 & 2) respectively. Station C & Station D are present in the North ~ West direction of the selected water bodies (1 & 2) at the effluent discharge sites. Screw capped airtight 5-liter polythene containers were used for sample collection from 20 cm below the water surface. The samples were properly sealed and preserved for further use.

3. RESULTS AND DISCUSSION:

In the present investigation the range of nitrate during the period of study was 1.0 mg/L to 7.1 mg/L. The nitrate values were found to be low in the month of January and from June there was an increase in the values. The range of nitrate was 0.7 mg/L to 6.0 mg/L at station 'A', 0.8 mg/L to 5.5 mg/L at station 'B', 0.5 mg/L to 5.7 mg/L at station 'C' and 1.0 mg/L to 7.1 mg/L at station 'D' in the year 2012 – 2013. Nitrate ranges from 0.6 mg/L to 5.1 mg/L, 0.8 mg/L to 6.1 mg/L, 0.5 mg/L to 5.9 mg/L and 0.9 mg/L to 7.0 mg/L at the stations A, B, C & D respectively during 2013 – 2014.

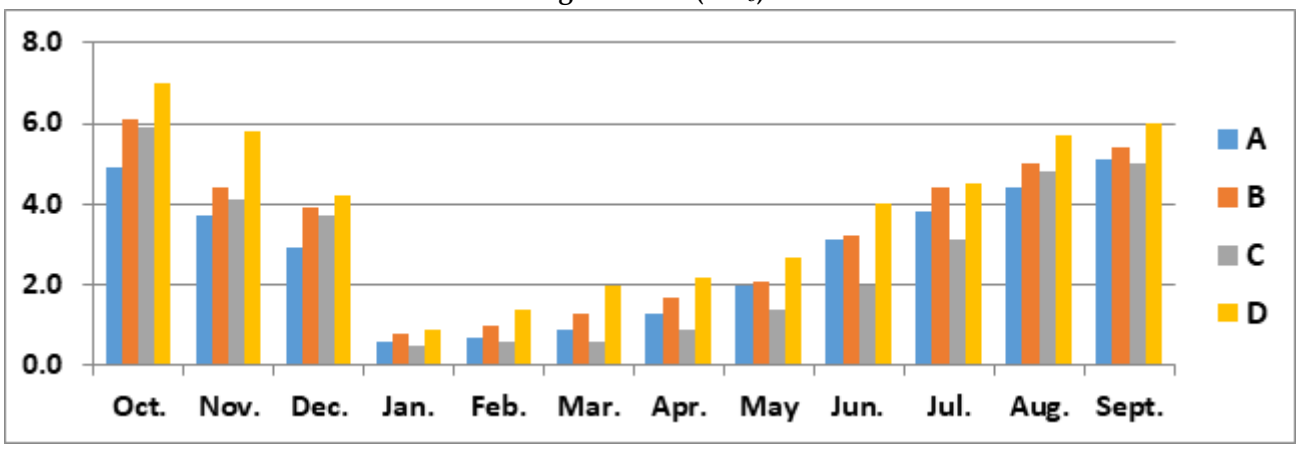
Table No. 1 Monthly Variation of Nitrate ($N0_3$) (mg/L) during Oct-2012 to Sept-2015

Year	2012-2013				2013-2014				2014-2015			
Month	A	B	C	D	A	B	C	D	A	B	C	D
Oct.	6.0	5.5	5.7	7.1	4.9	6.1	5.9	7.0	5.0	6.2	6.4	6.9
Nov.	5.9	4.7	4.5	5.0	3.7	4.4	4.1	5.8	3.7	4.5	4.8	5.9
Dec.	4.0	3.5	3.9	3.7	2.9	3.9	3.7	4.2	3.1	3.0	3.2	3.8
Jan.	0.7	0.8	0.5	1.0	0.6	0.8	0.5	0.9	0.5	0.9	1.0	1.1
Feb.	1.1	0.9	0.7	1.3	0.7	1.0	0.6	1.4	0.5	1.1	1.2	1.5
Mar.	1.3	1.0	0.8	1.9	0.9	1.3	0.6	2.0	0.7	1.8	1.7	2.1
Apr.	2.0	1.5	1.0	2.3	1.3	1.7	0.9	2.2	1.0	2.1	2.2	2.4
May	3.2	2.0	1.5	2.7	2.0	2.1	1.4	2.7	1.3	2.6	2.4	2.8
Jun.	3.8	2.9	2.2	4.1	3.1	3.2	2.0	4.0	2.1	3.5	3.6	4.2
Jul.	4.3	4.1	3.4	4.6	3.8	4.4	3.1	4.5	3.0	4.4	4.7	4.6
Aug.	4.9	4.7	4.0	5.9	4.4	5.0	4.8	5.7	3.9	5.7	5.5	6.1
Sept.	5.1	5.3	4.6	6.3	5.1	5.4	5.0	6.0	4.5	6.1	5.9	6.7



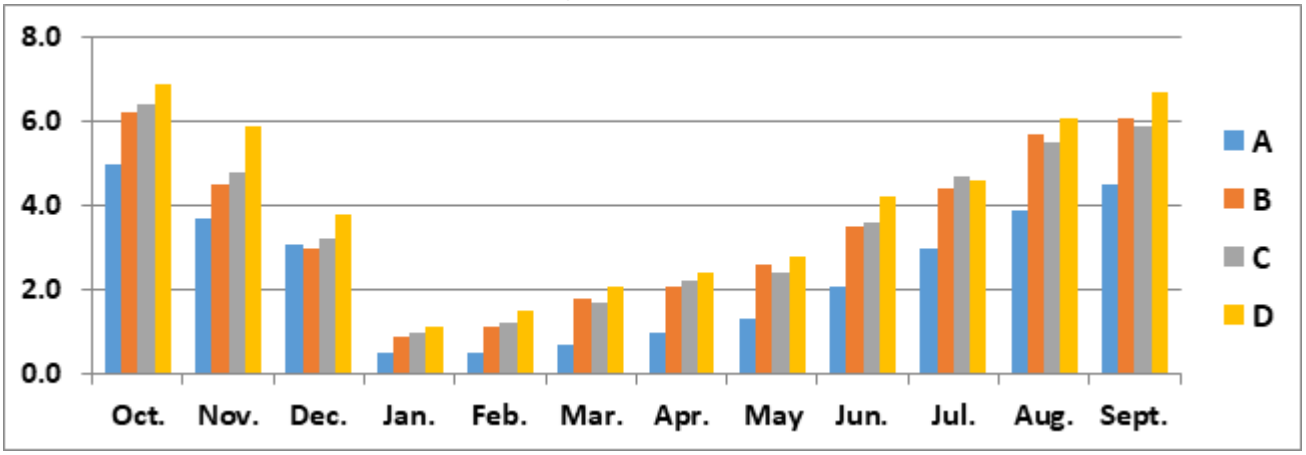
2012-13

Fig-1 Nitrate (NO_3)



2013-14

Fig-2 Nitrate (NO_3)



2014-15

Fig-3 Nitrate (NO_3)

In the year 2014 -2015 the nitrate values vary from 0.5 mg/L to 5.0 mg/L, 0.9 mg/L to 6.2 mg/L, 1.0 mg/L to 6.4 mg/L and 1.1 mg/L to 6.9 mg/L at the stations A, B, C & D respectively. The values of nitrate are given in Table -1 and illustrated in Fig. 1, 2 & 3.

Solanki, et al., [11] assessed the water quality of Lake Pandu, Bodhan and found high nitrates in the range of 24.8 mg/L to 71.2 mg/L in summer.

Srivastava, et al., [12] studied the monsoon variations on water chemistry of River Mahi and observed that the Nitrates concentration varies from 0.46 mg/L to 0.03

mg/L and 16.05 mg/L to 4.45 mg/L in pre and post monsoon seasons respectively.

Harclerode, et al., [13] studied on water quality and examined nitrate – N concentration by seasons and flow. There were significant differences in nitrate – N with low and high flow.

CONCLUSION

Control of nitrate in drinking water is an effective preventive measure. As per WHO guideline value for nitrate in drinking water is 50 mg/L and for nitrite is 3 mg/L. This is relatively readily achieved in centralised, piped, supplies, but is difficult in rural and small supplies. Some have suggested that the regulatory level for nitrate in drinking water is very conservative [14,15]. However, the discussion of the regulatory level has not thoroughly considered studies of the chronic health effect including cancer, adverse reproductive outcome and diabetes. Although a casual role of nitrate in these other health outcomes is not conclusive, recently studies that indicates the possible adverse effect of nitrate level below the MCL are of concern [16, 17,18]. Malnutrition and infection seem to increase the risk of methemoglobinemia [19]. The general health of the infants as well as vitamin-C intake may determine whether or not the condition develops [20]. The risk of methemoglobinemia amongst infants depends on many factors other than the ingestion of nitrate in drinking water, some foods & medications contain high level of nitrate [21] In presence of high concentration of nitrate in drinking water is toxic [22]. Due to high concentration (Over 100 mg/L) of nitrate in drinking water infants, less than 6 months old have been suffering from methemoglobinemia or blue baby diseases.

REFERENCES

1. World Health Organization. WHO Guidelines for drinking water quality. 2nd edition, addendum to volume 1: Recommendations. Geneva: WHO, 1998, p-8-10; and addendum to volume 2: Health Criteria and other supporting information.
2. WHO (2008) Guidelines of drinking water quality, 3rd edition incorporating the 1st and 2nd addendum, volume 1, Recommendation. Geneva WHO.
3. Staudt, 2003
4. Madison RJ and Brunett JO. overview of the occurrence of nitrate in groundwater of the United States; in, USGS national water summary, 1984: U.S. Water supply paper 2275, P.93-105.
5. Spalding RF and Exner ME. occurrence of nitrate in groundwater- a review: *Journal of Environmental Quality*, 1993, v.22, p. 392-402.
6. Thompson CA, Libra RD. Water quality related to alchemical in alluvial aquifers in Lowa; in proceeding of the agricultural impacts on groundwater-a conference, August 11-13 1986
7. Steichen J. Contamination of farmstead wells by pesticides, Groundwater monitoring review, 1988, v.8, no.3, p. 153-160.
8. UNICEF (1989)
9. Fields S. Global nitrogen cycling out of control. Environ health perspect, 2004; 112: A557-A563.
10. Lambert and Driscoll 2003
11. Solanki, et al., (2010)
12. Srivastava, et al., (2011)
13. Harclerode, et al., (2012)
14. Avery AA. Infantile methemoglobinemia: re-examining the role of drinking water nitrates. Environ health perspect 1999; 107.
15. Hirondelle 2002
16. Brender JD, Olive J ML. Dietary nitrites and nitrate nitro stable drugs and neural tube defect. Epidemiology 2004b, 15: 330-336.
17. Deroos AJ, Ward MH., Lynch CF., nitrate in public water system and the risk of colon and rectum cancer. Epidemiology 2003; 14:640-649.
18. Wayer PJ, Municipal drinking water nitrate level and cancer risk in older women, epidemiology 2001; 12:327-338
19. McDonald AT, Kay D. Water resources issues and strategies. UK: Longman Scientific and Technical, 1988, p 146-148.
20. Super M, Heese HV, Mackenie D. An epidemiological study of well water nitrates in a group of South West African/ Namibian infants. Water Research, 1981: 15: 1265-70.\
21. Sanchez, Echaniz et.al (2001)
22. Umavathi et. al (2007)