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Abstract

The study presented here was carried out at Yadgir town, Karntaka State. The water quality parameters were investigated for the period of two years (June 2012-May 2012) were compared with the staderds values prepared by WHO. 11 sampling stations were selected for the present study and samples were collected from the borewells of 11 stations at monthly intervals. The study results reveals that, the nitrate values were exceed the permissible limits, which is due to the use of excessive nitrogen content fertilizers and improper disposal of sewage in the study area.

Key words: *Ground water, Nitrate, Yadgir city, Water quality*

Introduction

Investigations regarding groundwater resources of various parts of India have been undertaken by Auden (1935), Chaturvedi (1943) has studied on determination of safe yield on heavy pumping Areas in Uttar Pradsh, Handa (1969) has reported nitrate levels in ground water of northern parts of India and also studied on the groundwater quality of semi-arid and arid zones of Rajasthan. Bhatnagar *et al.*, (1981) studied the hydrogeology and groundwater pollution of Ludhiana City. Kakkar (1981) and Thakur *et al.*, (1981) indicated high concentration of nitrate in ground water of south western parts of Haryana. Information of liminological and related aspects pertaining to drinking water resources occurring in northern part of Karnataka state of Peninsular India is almost lacking. However, some workers have investigated groundwater quality of Karnataka state. Narayana and Suresh (1989) investigated the chemical

characteristics of groundwater of Mangalroe City, Hegde *et al.,* (1992) analyzed the quality of groundwater's along and across the sewage courses in Hubli City and assessed the degree of quality of Bangalore Metropolis. Latha *et al.,* (1999) studied the occurrence of fluoride in eastern and southern Karnataka. This study is intended to monitor the underground water quality of yadgir city. This pilot study will also be helpful in preparing the water supply scheme of the rural areas of the Karnataka and country as a whole.

Materials and methods

Study area

Yadgir is a town located between $16^{O}45'51.60''N$ and 77^{O} 08'27.05" of Northeast Karnataka state and headquarters for administration of recently created Yadagiri district in Karnataka state. Officially declared as 30th district of Karnataka state since April 2010

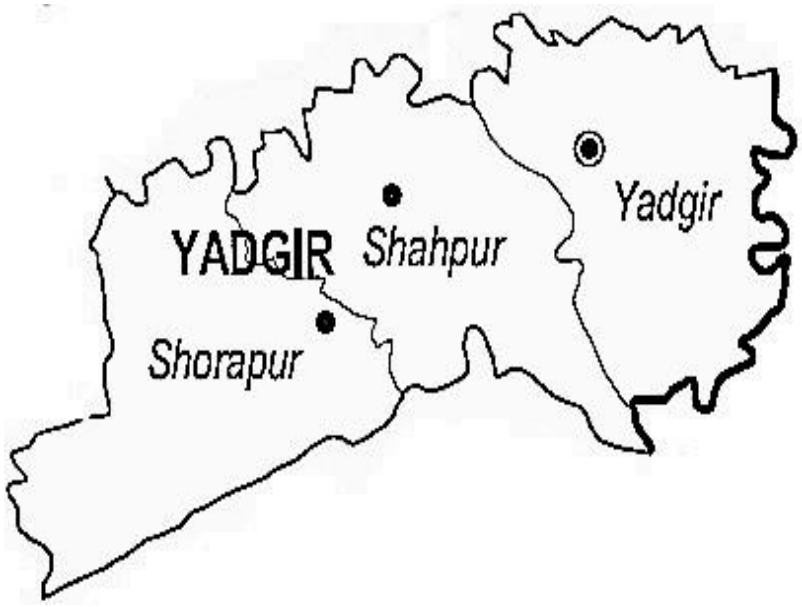

Fig 1. Showing Yadir ditrict and Yadgir City

Nitrates of water samples were determined directly by UV visible spectrophotometer Scientek Instrument Pvt. Ltd., (Computer based, Dathelie, Secomom, France) using "BEER-LABT LAW". The instruments can determine the concentration of several basic components in a mixture without cross chemical reactions. The reading will be displayed on the monitor and printed results were taken out for result purpose. Since the estimation of nitrates was done by Anthelie data spectrophotometer and direct reading were presented.

Results and discussion

Nitrate values recorded in all 11 stations in the Yadgir city were presented in Table 1.

Nitrate values during northeast monsoon of 2012 exhibited values between 165 to 195 mg/l in Laxmi Nagar, 150to 195 mg/l in Basava Nagar, 150 to 170 mg/l in Shiv Nagar, 180 to 240 mg/l in Chama Layout, 300 to 350 mg/l in Bakadi geri, 220 to 255 mg/l in Katagarwadi, 188 to 200 mg/l in Hosalli area, 170 to 215 mg/l in Durga Nagar area, 165 to 190 mg/l in K.E.B Colony, 134 to 155 mg/l in Ambedkar Chowk, 110 to 123 mg/l in Swami Vivekananda Nagar, respectively.

While during the same season, of 2011 Nitrate value between 195 to 225 mg/l, 165 to 190 mg/l, 150 to 185 mg/I, 180 to 255 mg/I, 320 to 375 mg/l, 240 to 274 mg/l, 185 to 235mg/l, 190 to 265 mg/l, 180 to 200 mg/l, 160 to 170 mg/l, 140 to 150 mg/l, in all sampling stations respectively.

Nitrate values during Summer season of 2011 exhibited values between 76 to 95.5 mg/l in Laxmi Nagar, 110 to 115 mg/l in Basava Nagar, 54 to 75 mg/l in Shiv Nagar, 160 to 185 mg/l in Chama Layout, 165 to 210 mg/I in Bakadi geri, 85.2 to 95.0 mg/I in Katagarwadi, 76 to 95 mg/I in Hosalli area, 136 to 150 mg/l in Durga Nagar area, 100 to 135 mg/I in K.E.B Colony, 58 to 75 mg/I in Ambedkar Chowk, 50 to 75 mg/l in Swami Vivekanada Nagar respectively.

While during the same season, of 2012 Nitrate values between, 110 to 125 mg/l, 85.5 to 115 mg/l, 63 to 70 mg/I,43 to 169mg/1, 210 to 250 mg/l, 110 to 135 mg/l, 140 to 195 mg/l, 125 to 144 mg/l, 110 to 135 mg/l, 64 to 85 mg/l, 58 to 70 mg/l, in all sampling stations respectively.

Nitrate values during southwest monsoon season of 2011 exhibited values between 95.5 to 185 mg/l in Laxmi Nagar, 125 to 160 mg/l in Basava Nagar, 85 to 150 mg/l in Shiv Nagar, 210 to 225 mg/l in Chama Layout, 210 to 356 mg/l in Bakadi geri, 110 to 175 mg/l in Katagarwadi, 110 to 180 mg/l in Hosalli area, 145 to 185 mg/l in Durga Nagar area, 135 to 170 mg/l in K.E.B Colony, 90 to 135 mg/l in Ambedkar Chowk, 85.5 to 125 mg/l in Swami Vivekanada Nagar respectively.

While during the same season, of 2012 Nitrate values between 95.5 to 170 mg/l, 110 to 160 mg/l, 87.5 to 140 mg/l, 210 to 225 mg/l, 210 to 300 mg/l, 170 mg/l, 95 to 130 mg/l, 90 to 115 mg/I, 110 to 115 mg/I, 120 to 135 mg/I, 110 to 125 mg/l, 150 to 170 mg/l, in all sampling stations respectively.

Nitrogen is a major constituent of the earth's atmosphere and occurs in many different gaseous forms such as elemental nitrogen, nitrate and ammonia. Natural reactions of atmospheric forms of nitrogen with rainwater result in the formation of nitrate and ammonium ions.

There are two main source of pollution of nitrate entry in the ground water is extensive use of chemical fertilizers and poor maintenance of sewage water. Nitrate contamination of groundwater is one of the serious problem and appropriate actions should be taken immediately (Abu Maila *et. al .,* (2004).

In the present investigation, the nitrate concentration varied between 105 mg/l to 416 mg/l in Yadgir City (Table-1) all the water samples are above permissible limits except during summer season. Permissible limit is 45 mg/l as per the Indian Standards, but all the stations showed excess nitrate concentration in the Yadgir City. This is due to highly use of fertilizers in agriculture fields. Nitrate has showed a seasonal trend and noticed higher concentration during northeast and southeast monsoon seasons. While in summer nitrate was recorded lesser than other seasons. In the present study nitrate showed significant positive correlation with Sodium ($p< 0.05$, $r = 0.76$), potassium ($p<. 0.05$, $r = 0.78$) and phosphate ($p< 0.1$, $r =.0.92$).

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Table No. 1: Monthly variations in Nitrates (mg/l) of different sampling stations of Bhalki City

Stations	Oct 2010	Nov	Dec	Jan 2011	Feb	Mar	Apr	May	jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 2012	Feb	Mar	Apr	May	Jim	Jul	Aug	Sep	Average
Laxmi Nagar	165	170	195	185	95.5	85.5	76	85.5	95.5	105	115	185	195	195	225	195	115	125	110	112	95.5	115	130	170	140.43
Basava Nagar	150	165	195	170	110	112	110	115	125	135	150	160	170	170	190	165	95.5	85.5	95	115	110	110	125	160	136.58
Abedkar chowk	150	165	165	170	54.0	56	68	75	85	95	115	150	150	170	185	185	65.0	63	65	70	87.5	95	110	140	113.77
Chama layout	220	240	210	180	160	185	165	169	220	210	220	225	240	245	255	180	169	136	165	136	210	220	220	225	200.41
Bakadigeri	300	330	320	350	190	165	190	210	210	225	250	356	320	340	370	375	225	210	220	250	210	250	275	300	268.75
Katagarwadi	220	240	240	255	87.5	85.2	90	95	110	125	170	175	240	245	255	274	110	112	125	135	135	145	165	170	166.82
Hosalli nagar	188	191	195	200	76.0	76.0	85	95	110	130	155	180	185	210	235	235	195	156	140	150	120	129	130	144	154.58
Durga Nagar	170	190	2000	215	140	150	136	146	145	155	185	170	190	220	257	265	144	140	135	125	140	140	155	165	169.91
KEB quarters	165	170	[60	190	100	110	125	135	135	140	170	160	180	180	200	195	125	135	110	125	140	145	160	170	151.04
Ambedkar chowk	137	155	134	145	59.0	58	68	75	90	150	135	125	160	170	160	165	68	64	75	85	95	130	125	130	114.9
Swami Vivekanda magar	110	112	116	123	540	50	68	75	85.5	95.5	120	125	140	140	150	150	58	64	68	70	90	95.5	110	115	99.35