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A Study On Chemical Analysis Of Drinking Water From Some Communities In Nandyal Rural Areas Of Kurnool District ,Andhra Pradesh. INDIA

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Abstract

This study consisted of the determination of the trace metal ions and some physiochemical properties in drinking water samples from the neighboring villages of Nandyal region, Kurnool district, where drinking water samples are not treated before it is consumed. The purpose was to ascertain the quality of water from these sources. Samples were taken from ten sampling points and analyzed for the following parameters Fe, Cu, Mn, Zn, Al, pH,EC,NO3-, SO4 , and F- using the procedure outline in the plain test photometer method. The data showed the variation of the investigated parameters in samples as follows: pH 5.47-7.39, conductivity (EC) 49-1168 ?s/cm, turbidity 4.68-73.34JTU, F - 0.54 to 1.29mg/L.NO3-11.19 to 39.76 mg/L , SO42- 41.2 to 73.0 mg/L Cu 1.25 to 2.96 mg/L. Fe 0.08-0.94mg/L, Zn 5-19 mg/L,Mn 0.004-0.016 mg/L and Al 0.07-0.18 mg/L , The concentrations of most of the investigated parameters in the drinking water samples from Nandyal region were within the permissible limits of the World Health Organization drinking water quality guidelines.

Index terms— drinking water, Nandyal Rural region areas, World Health Organization, Trace metals, physiochemical Properties.

1 INTRODUCTION

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2 MATERIALS AND METHODS

3 a) Sample collection

The drinking water samples were collected in prewashed (with detergent, diluted HNO3 and doubl y de-ionized distilled water, respectively) polyethylene bottles. pH and conductivity of the samples were measured while collecting the samples. Each water sample was taken four times at four different sampling periods approximately three month apart. Samples were collected in January, April,July and October ;2009.The determinations of the physical and other chemical properties of the water samples were performed on the same day of sampling. For surface water sampling, the bottles and caps were rinsed three times with water to be sampled during sampling and for ground water, the samples were obtained directly from the water pump after allowing the water to run for at least five minutes and each sample bottle and its cap rinsed three times. These samples were subsequently

stored at 4 °C for as short a time as possible before analysis to minimize physicochemical changes **??**Anonymous, 1996).Because very little particulate matter was present in the sample, filtration was not considered necessary.

4 b) Methodology

Analytical water test tablets (photometer grade) reagents for specific test were used for the preparation of all solutions. Each sample was analysis for , Fe, Cu,Mn, Zn, Al, NO3-, SO4 2-, and F-using procedure s outline in the Palintest Photometer Method (Palintest Photometer 5000) for the examination of water and ood drinking water quality is essential for the well being of all people. Unfortunately in many countries around the world, including India, some drinking water supplies have become contaminated, which has impacted on the health and economic status of the populations Contaminants such as bacteria, viruses, heavy metals, nitrates and salt have found their way into water supplies as a result of in adequate treatment and disposal of waste industrial discharges, and over-use of limited water resources Even other Chemicals to be harmful to human health. Unfortunately, this problem arose because the G detailed chemical investigation. The natural water analyses for physical and chemical properties including trace element contents are very important for public health studies. These studies are also a main part of pollution studies in the environment (Kot., et al,. 2000; Soylak. et al., 2002 a). According to our literature review Some physical and chemical properties of the samples were determined by using standard analytical methods.

groundwater was extracted for drinking without a Mohemmad Rafi.K ? III.

5 Results & Discussion

The average physical and chemical properties of the drinking water samples including pH, electrical conductivity, turbidity, fluoride, nitrate ,sulphate from these sample points (1,2,3,4,5,6,7,8,9,10) were given in Table 1. The pH values were in the range of 5.47 to 7.39. Minimum pH (5.47) was observed from an well in Panyam rural area(1) and a maximum of (7.39) was observed from the Panyam stream(2) at Nandyal Rural area. The pH levels were lower than permissible limit (6.5-8.5) in 10% villages, the rest were within optimum limit. The recommended permissible limit for electrical conductivity (EC) is 300 ?s/cm. By analyzing the results 80% villages showed EC lower than permissible limit The value for EC ranged from 49 to 275 ?s/cm, except that of the groundwater samples from Konidedu(4) and Alamur(**??**) which recorded 963 ?s/cm and 1168 ?s/ cm respectively. Turbidity is a measure of the cloudiness of water. It has no health effects. However,turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches . All the samples have turbidity values greater than the WHO permissible value of 10 JTU except that of the groundwater sample from Neravada (5) and Kowluru (6) villages which recorded values of 5.38 JTU and 4.68 JTU respectively. Fluoride (F-) varied from 0.54 to 1.29 mg/L.Minimum (0.54 mg/L) and maximum (1.29 mg/L) concentration of F-was observed from Odugandla (9) and Balapanuru (10) villages respectively (Table 1). Permissible limit for F concentration is 1-1.5 mg/L according to **??**HO (2003).The data revealed that 50 % villages are with in limit.. Nitrate in the investigated samples were found to be in a range of 11.19 to 39.76 mg/L .The range of sulphate (SO42-) in the samples was 41.2 to 73.0 mg/L but was negligible at Maddur (8) The concentrations of the major ions were below the permissible limits given by the WHO. The concentrations of trace metals (Cu, Fe, Zn, Al and Mn) ions in the drinking water samples are presented in Table 2. The lowest and the highest levels of trace metals detected ranged between 0.004 mg/L -0.016mg/l for manganese in the sample from Konidedu and 2.96 mg/L for copper from the K.c.canal at Maddur villages. The highest level of total trace metals ions were found in the water sample from K.C Canal at Maddur Average copper concentrations in the drinking water samples were in the range of 1.25 to 2.96 mg/L. The levels in all the stations were above the limit of 1.0 mg/L permitted by WHO in drinking water. This indicates that the local mineral deposit in the catchment area studied may have high levels of copper. Copper is an essential nutrient, but at high doses it has been shown to cause stomach and intestinal distress, liver and kidney damage, and anemia (US EPA, 2003). The highest iron level was found in the sample from Kowlur as 0.94 mg/L and the lowest in Panyam as 0.08 mg/L, almost all the samples contain higher amount of iron except in Panyam where it was below the acceptance limit of iron which is 0.1 mg/ L permitted by the WHO. The levels of zinc in the samples were in the range of 5 mg/L to 19 mg/L . 80% village are between limit according to WHO . Average manganese levels were found to be in the range of 0.042 mg/L to 0.63 mg/L. 70% villages water samples were with in the WHO permitted limit Aluminum concentration in the drinking water samples were in the range from a limit which is 0.05 mg/L. Aluminum concentration in the drinking water samples were in the range from a minimum of 0.07 mg/L from Panyam stream canal stream at Balapanur to a maximum of 0.18 mg/L from the river at Nandyal rural area. Aluminum was considerable below the limit of 0.5 mg/L permitted by WHO in drinking water. A linear regression correlation test was performed to investigate correlations between metal concentrations. The whole data were subjected to statistical analysis and correlation matrices were produced to examine the interrelationships between the investigated metal concentrations.

Correlations between metal concentrations in water samples have been widely studied by a number of authors **??**Mohmood,et al, 1998 andAsubiojo, et al, 1997).

6 AREA vs Fe

7 DISCUSSION AND COLCLUSION

In conclusion, the concentrations of the investigated major ions and trace metal ions in the drinking water samples from these communities in the Nandyal region, Iddia were found below the guidelines for drinking waters given by the World Health Organization (WHO). Further research on other communities in this region for drinking water analyses is required as levels of contaminants may vary due to different soil types, water chemistry and different human activities. No correlations were found between metal concentrations in the drinking water samples. [1]

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Figure 1: Figure: 5 :Figure: 6 :

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The physical and chemical parameters of the drinking water samples

Sampling site	Sample site code	Water Type	pH	EC ?s/cm
Panyam Rural area	1	Surface	6.78	67
Panyam Stream	2	Surface	7.37	129
Panyam Lake	3	Surface	7.17	184
Konidedu	4	Ground	5.47	963
Neravada	5	Ground	6.23	213
Kowlur	6	Ground	6.68	198
Alamur	7	Ground	7.12	1168
Maddur	8	Tap Water	7.43	95
Odiguntla	9	Tap Water	7.29	102
Balapanur	10	Tap Water	7.09	116

Figure 2: Table 1 :

2

Sampling site	Sample site code	Water Type	Turb. NTU	F (mg/l)
Panyam Rural area	1	Surface	36.0	1.03
Panyam Stream	2	Surface	43.67	1.18
Panyam Lake	3	Surface	51.53	0.99
Konidedu	4	Ground	62.98	0.68
Neravada	5	Ground	5.35	0.92
Kowlur	6	Ground	4.68	0.74
Alamur	7	Ground	73.34	1.05
Maddur	8	Tap Water	32.76	1.23
Odiguntla	9	Tap Water	26.88	0.54
Balapanur	10	Tap Water	29.0	1.29

Figure 3: Table 2 :

3

Sampling site	Sample site code	Water Type	NO 3 -(mg/l)	2-SO (mg/l)	4
Panyam Rural area	1	Surface	11.19	41.9	
Panyam Stream	2	Surface	18.12	54.5	
Panyam Lake	3	Surface	27.07	41.2	
Konidedu	4	Ground	24.37	59.2	
Neravada	5	Ground	32.49	68.7	
Kowlur	6	Ground	19.45	53.4	
Alamur	7	Ground	22.56	52.9	
Maddur	8	Tap Water	39.76	–	
Odiguntla	9	Tap Water	32.88	73.0	
Balapanur	10	Tap Water	29.69	48.4	

Figure 4: Table 3 :

4

Sampling site	Sample site code	Water Type	Cu	Zn
Panyam Rural area	1	Surface	1.25	8
Panyam Stream	2	Surface	1.76	5
Panyam Lake	3	Surface	1.98	7
Konidedu	4	Ground	1.47	12
Neravada	5	Ground	2.38	16
Kowlur	6	Ground	2.67	11
Alamur	7	Ground	2.12	19
Maddur	8	Tap Water	2.96	9
Odiguntla	9	Tap Water	1.98	8
Balapanur	10	Tap Water	2.25	13

Figure 5: Table 4 :

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Sampling site	Sample site code	Water Type	Mn	Fe
Panyam Rural area	1	Surface	0.042	0.08
Panyam Stream	2	Surface	0.054	0.12
Panyam Lake	3	Surface	0.23	0.25
Konidedu	4	Ground	0.058	0.76
Neravada	5	Ground	0.63	0.68
Kowlur	6	Ground	0.08	0.94
Alamur	7	Ground	0.39	0.89
Maddur	8	Tap Water	0.066	0.27
Odiguntla	9	Tap Water	0.414	0.34
Balapanur	10	Tap Water	0.313	0.48

Figure 6: Table 5 :

6

Sampling site	Sample site code	Water Type	Al
Panyam Rural area	1	Surface	0.10
Panyam Stream	2	Surface	0.07
Panyam Lake	3	Surface	0.09
Konidedu	4	Ground	0.08
Neravada	5	Ground	0.11
Kowlur	6	Ground	0.15
Alamur	7	Ground	0.14
Maddur	8	Tap Water	0.12
Odiguntla	9	Tap Water	0.16
Balapanur	10	Tap Water	0.18

Figure 7: Table 6 :

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