



Research Article

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**Physico-chemical parameters of ground water and pond water samples in and around Nagercoil Town, Kanyakumari District**

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**ABSTRACT**

Ground water samples and fresh water samples were collected during monsoon 2011 (September, October, November, and December) and post monsoon 2012 (January, February) physico chemical parameters were analysed and the results were compared with water quality standards described by WHO. The present study estimate the nature of five ground water samples near Hospital areas and four surface water samples away from Hospital Areas in and around K.K.District.

**Keywords:** Physico Chemical Parameters, Ground Water, Fresh Water, Nutrients, Minerals, Hospital Wastes.

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**INTRODUCTION**

The water pollution is a burning issue all over the world. Ground water resource is an important water resource on the earth. It can be efficiently taken from the deep well. Is mainly used to fulfill our need for domestic use and irrigation. Ground water is the main source of life for many people in the world. Depending upon the climate and temperature man requires a minimum body intake of water which varies from 5 to 8 litres per head per day. If there is no intake of water into the body, death can ensure within ten days (1). water is essential to man for maintaing personal body hygiene & free from diseases. Ground water pollution is an environmental problem that has attracted national attention only in recent years. Increased human activities, contamination of surface and ground water by sewage disposal, municipal land falls and drainage system and also leading the problem too much worse.

In the present analysis five ground water samples were taken from Hospital areas in and around Nagercoil Town. Sample I is from Kottar, sample II is taken from near Ayurvedic Government Hospital. Sample III is taken nearby Asaripallam Government Hospital, Sample IV is from chenpagaranputhooor (near a primary Health center), Sample V is from near a Private Hospital area of Ethamozhi. And also the analysis includes four surface water samples from three ponds and one from mannakudy Estuary. (Sample VI) Sample VIII from putharipond, Sample VIII from Kariamankampuram pond, Sample IX is from Chunkankadai pond.

**EXPERIMENTAL SECTION**

Regular monthly collections of Samples were made. The samples were brought to the laboratory in labeled bottles for the analysis of physico chemical parameters. The parameters like pH, Electrical conductivity, TDS, total Hardness, Alklinity, The amount of nutrients, Fluoride content, Phosphate content were analysed as per the standard methods described in APHA (1995)

## RESULTS AND DISCUSSION

The parameters were analysed as per the standard methods described in APHA(1995). The pH values were higher in the Hospital areas due to the mixing of Hospital wastes with the Ground water. The pH values are higher in the month of February due to lack of rain. The EC values of the Hospital area samples are higher than that of Fresh water samples. This is also due to the presence of many impurities. Again the EC value of VI sample is very high due to mixing of river water with sea water. The Alkalinity values were found higher in the Hospital area samples than the fresh water samples. Since the hospital wastes contain more alkaline substances. The total Hardness values are also high in the Ground water samples taken near Hospital areas due to the presence of larger amount of calcium and magnesium in the medicines. The TDS values of Hospital area samples is higher due to the presence of large amount of solid wastes from the Hospitals. Higher concentration of TDS cause Adverse Taste effect (2)

## pH

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	7.74	7.6	7.5	7.5	7.1	7.6	7.4	7.8	8.6
Oct.	7.38	7.4	8.4	7.8	6.4	7.4	8.6	8.4	8.09
Nov.	7.5	6.5	5.7	7.8	8.4	7.8	7.9	8.6	7.9
Dec.	7.04	7.2	7.9	7.9	7.0	7.2	8.4	7.9	7.9
Jan.	6.71	7.5	7.5	7.4	7.4	7.2	8.5	8.5	8.2
Feb.	8.5	9.2	9.0	8.7	8.8	8.0	9.0	8.5	8.8

## EC (mcs/cm)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	1388	1353	1049	892	826	11466	267	367	103
Oct.	1128	1222	1004	1001	1128	38401	251	148	118
Nov.	960	1202	923	1031	847	1072	321	451	265
Dec.	855	1203	981	977	375	17491	307	664	185
Jan.	1074	1019	1194	1019	904	31820	225	695	271
Feb.	511	1179	1312	1005	847	34452	182	231	243

## Alkalinity (mg/l)

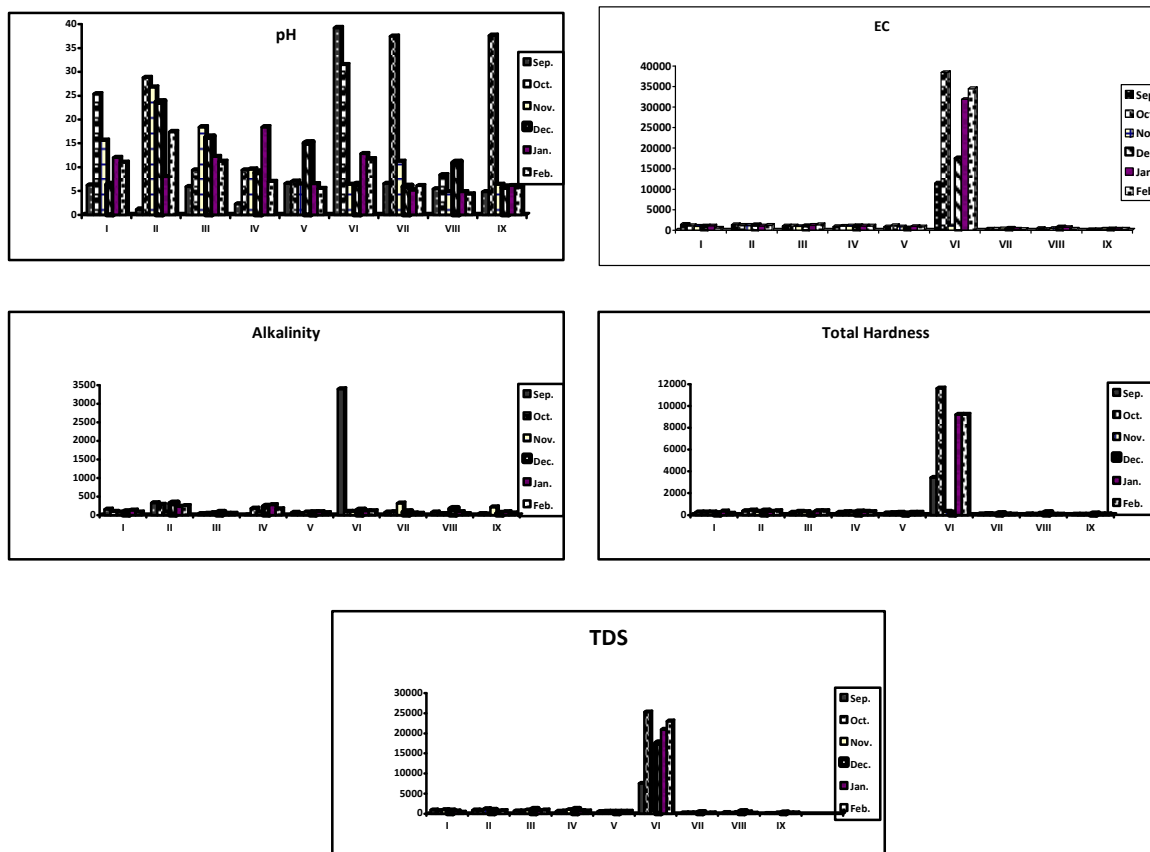
	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	156	324	32	1.28	72	3400	76	80	36
Oct.	92	280	40	184	32	96	88	32	22
Nov.	80	76	60	76	76	96	320	32	216
Dec.	76	312	56	220	48	120	80	160	32
Jan.	128	228	40	272	88	108	48	88	88
Feb.	80	248	44	160	60	112	40	32	52

## Total Hardness (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	240	360	220	216	168	3400	76	80	36
Oct.	240	410	300	280	192	11600	100	40	28
Nov.	256	320	280	260	208	320	80	116	56
Dec.	76	312	56	220	48	120	80	160	32
Jan.	340	320	360	320	232	9200	68	48	80
Feb.	136	376	360	280	232	9200	40	52	60

## TDS(mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	916	893	692	589	545	7528	176	242	68
Oct.	774	807	662	660	562	25344	166	98	78
Nov.	960	1202	923	1031	567	718	215	302	177
Dec.	564	794	981	977	245	17491	202	438	122
Jan.	709	672	788	785	597	21001	148	458	179
Feb.	342	790	879	673	567	23083	182	155	163



Regarding the nutrients the first V samples contain higher amount of Ca, Na, K. The amount of Fe is higher in the VI sample due to the waste materials, impurities present in the sea water which mixes with the River water. The amount of nitrite, nitrate, ammonia is also higher in the samples of Hospital areas. High level of nitrate content affect health among children causing methalmoglobinaemia (3).

#### Ca (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	52	100	52	45	50	160	22	19	11
Oct.	48	44	72	32	58	960	24	11	8
Nov.	46	104	32	72	40	60	19	34	16
Dec.	48	82	61	64	40	192	16	67	21
Jan.	80	96	104	108	27	1040	37	16	22
Feb.	32	56	104	58	50	1040	14	11	14

#### Na(mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	184	116	117	82	97	980	22	42	8
Oct.	116	97	87	94	97	3350	16	14	11
Nov.	102	14	48	19	98	84	31	42	29
Dec.	84	93	92	79	33	1420	30	62	13
Jan.	97	79	92	93	82	3200	15	71	25
Feb.	49	93	116	79	82	13200	26	19	23

#### K(mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	42	16	13	13	9	120	2	5	1
Oct.	18	19	26	24	21	325	2	3	1
Nov.	9	16	12	11	14	7	4	6	2
Dec.	13	16	14	12	4	32	5	13	2
Jan.	13	12	14	16	10	425	16	2	5
Feb.	7	16	14	12	10	425	2	6	3

## Fe (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	0.24	0.00	0.00	0.12	0.00	0.24	0.24	1.65	0.00
Oct.	0.12	0.12	0.12	0.00	1.88	1.65	2.00	0.60	1.53
Nov.	0.00	0.00	0.17	0.00	3.29	3.06	3.29	0.94	0.35
Dec.	0.00	0.00	0.00	0.00	0.24	2.71	2.82	0.24	0.24
Jan.	0.24	0.00	0.00	0.24	0.12	0.00	0.12	0.24	0.24
Feb.	0.35	0.00	0.00	0.00	0.00	0.59	0.94	1.06	0.59

## Nitrate (mg/l)

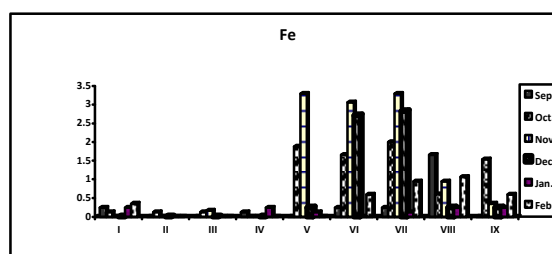
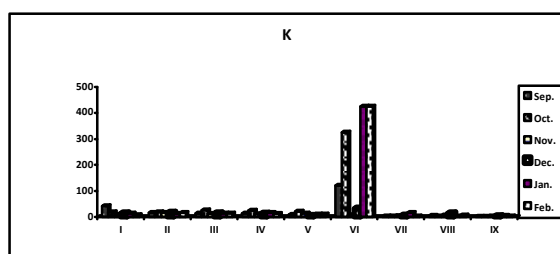
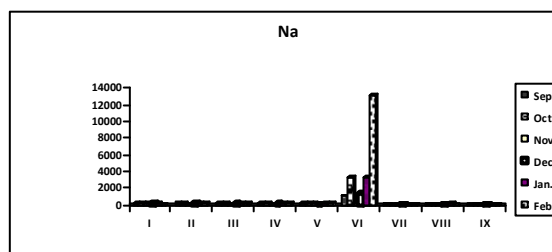
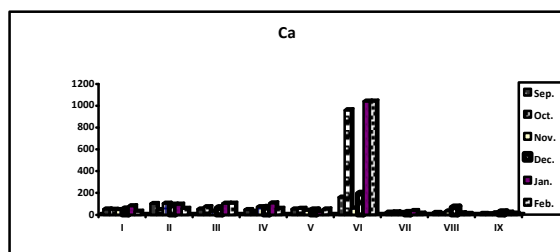
	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	9	11	10	9	10	5	6	8	1
Oct.	10	9	9	10	11	4	8	5	6
Nov.	10	9	8	10	7	9	4	6	3
Dec.	9	11	11	10	7	10	7	8	4
Jan.	9	10	11	11	7	4	7	10	8
Feb.	9	10	11	11	9	8	3	5	4

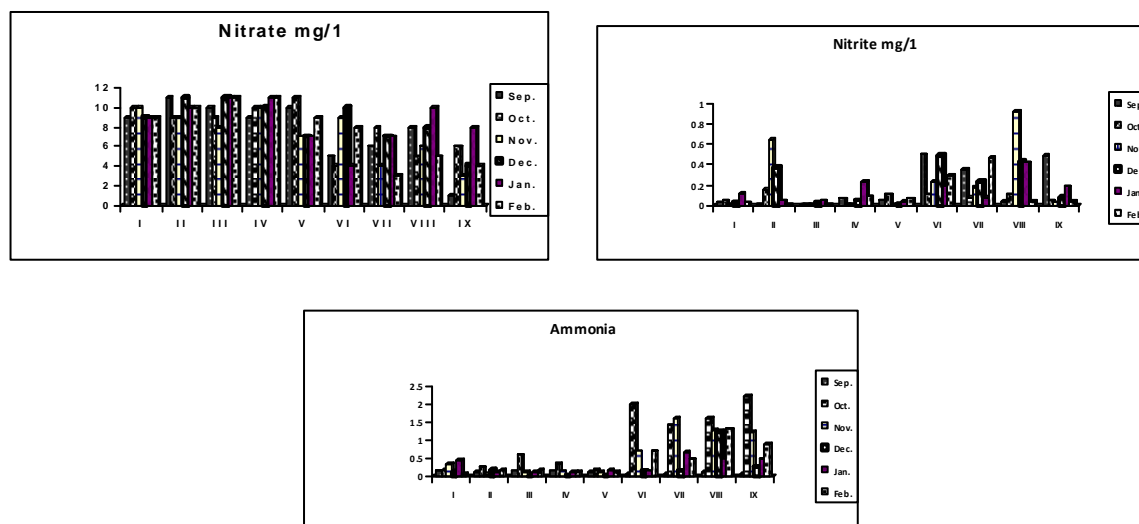
## Nitrite (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	0.03	0.01	0.00	0.07	0.05	0.5	0.35	0.036	0.49
Oct.	0.05	0.16	0.01	0.01	0.11	0.11	0.08	0.11	0.05
Nov.	0.01	0.65	0.01	0.01	0.01	0.24	0.18	0.92	0.03
Dec.	0.03	0.38	0.03	0.05	0.01	0.49	0.24	0.43	0.08
Jan.	0.12	0.05	0.05	0.24	0.04	0.20	0.08	0.42	0.19
Feb.	0.03	0.01	0.01	0.09	0.07	0.30	0.47	0.04	0.04

## Ammonia (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
Sep.	0.12	0.08	0.12	0.12	0.08	0.04	0.04	0.08	0.04
Oct.	0.15	0.23	0.58	0.31	0.15	2.00	1.42	1.62	2.23
Nov.	0.31	0.04	0.08	0.12	0.08	0.69	1.62	1.27	1.23
Dec.	0.08	0.15	0.00	0.00	0.00	0.12	0.13	1.23	0.23
Jan.	0.42	0.08	0.08	0.08	0.15	0.12	0.65	0.50	0.46
Feb.	0.04	0.15	0.15	0.08	0.08	0.69	0.46	1.31	0.88





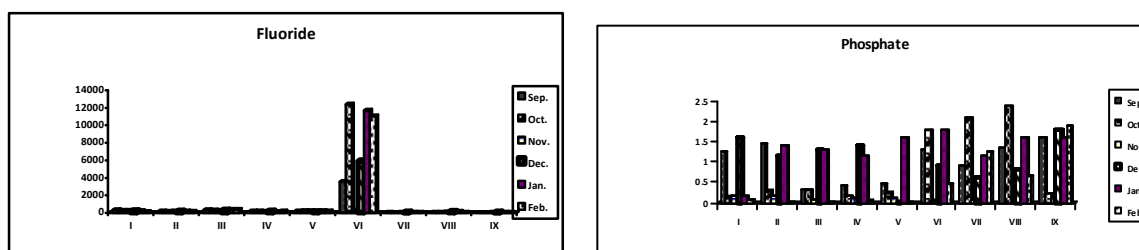
Fluoride is a natural component of water in many areas and its presence in drinking water has been linked to lower dental cavity. For destroying the microbes fluoride is often added to drinking water (4). The Fluoride level is higher in the Hospital area samples, because of the medicines containing Fluorides. When the Fluoride level across the permissible limit (1.2mg/l) in drinking water cause some skeletal damages called skeletal Fluorosis (5). The VI sample contains an excess of Fluoride because of the seawater which contains many dissolved impurities. The Phosphate amount is also higher in the Hospital areas than the Fresh water samples. Most of the medicines prescribed by the Doctor's contain Phosphate as one of the ingredients.

Fluoride (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
<b>Sep.</b>	320	190	320	182	192	3550	34	48	20
<b>Oct.</b>	260	150	280	170	224	12400	20	24	20
<b>Nov.</b>	256	185	264	160	215	305	36	78	40
<b>Dec.</b>	196	140	252	146	74	5900	42	96	30
<b>Jan.</b>	240	170	355	130	206	11700	36	145	28
<b>Feb.</b>	116	168	370	174	204	11050	42	46	40

Phosphate (mg/l)

	I	II	III	IV	V	VI	VII	VIII	IX
<b>Sep.</b>	1.25	1.45	0.3	0.4	0.45	1.3	0.90	1.35	1.6
<b>Oct.</b>	0.12	0.28	0.3	0.16	0.24	1.80	2.1	2.4	0.20
<b>Nov.</b>	0.15	0.15	0.05	0.1	0.10	0.03	0.05	0	0.1
<b>Dec.</b>	1.6	1.15	1.3	1.4	0.00	0.9	0.6	0.8	1.80
<b>Jan.</b>	0.15	1.4	1.3	1.15	1.6	1.80	1.15	1.6	1.6
<b>Feb.</b>	0.05	0	0	0.03	0	0.45	1.25	0.65	1.9



## CONCLUSION

Analysis of Physico – Chemical parameters of the water samples (Ground water near Hospital areas) reveals that they are highly polluted by the wastages of Hospitals. The VI sample is also highly polluted because of mixing of sea water with river water.

**Acknowledgment**

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**REFERENCES**

- [1] H.M. Dix; *Public water supplies of the 100 largest cities in the United States; U.S.Goel. Surv. Water Supply Paper*, **1981**, 1812.364.
- [2] R.K.Trivedy and P.K.Goel; *Chemical and Biological Methods, Water Pollution Studies*, Environmental Publication, Karad, **1986**.
- [3] A. Elmidaovi; et al, *Pollution of Nitrate in moroccan ground water. Removal by Electro dialysis*, University of Ibn Tofail, Laboratory of separation processes. Department of Chemistry, Faculty of sciences, Kenitra, Morocca, **2000**, p. 1246.
- [4] M.L. Davis and D.A. Cornwell, *Introduction to Environmental Engineering*, II<sup>nd</sup> Edition, MC Graw – Hill Inc. Publication, Newyork, **1991**.
- [5] EPA – Us Environmental Protection Agency, **1986**.