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Assessment of Ground Water Quality in Medchal-Malkajgiri District

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Abstract: Water is the most important substance in our daily life. Without water, life would not have been possible. The magnitude of water problem is increased due to poor drainage system, unplanned industries, increase of pollution, influxes of people from rural areas and other human activities. Due to rapid increase in population, urbanization and industrialization in Hyderabad have resulted the drastic increase in water pollution, which is one of the largest and smart city in India. In this study the ground water samples are collected in different seasons i.e., pre-monsoon and post-monsoon in the year 2016 for analysis from various places of Rangareddy district (Medchal) in Telangana State. The Physico-chemical parameters such as pH, total dissolved solids (TDS), chloride (Cl), fluoride (F), nitrate(NO₃), Sulphate(SO₄⁻²), hardness (CaCO₃, MgCO₃), sodium(Na), potassium(K) are analyzed with different analytical methods used by technical instruments. The results were compared with standard values given by World Health Organization (WHO). The present study revealed that the parameters of water which is too higher than the standard limits.

Keywords: Physicochemical parameters, Water pollution, Total Hardness, Fluoride and Nitrate.

I. INTRODUCTION

India is the biggest developing country having 1.3 billion population, it needs to provide more facilities in various sectors for the peoples' sustainability. It is developing in agriculture in rural level, organizations and industries at urban areas. Urbanization is more because growth rate is more at urban areas like Bengaluru, Hyderabad, Amaravati etc. Hyderabad is situated at the banks of Musi river and it has great history, it is the capital city of Telangana state and Andhra Pradesh. Hyderabad city has good climate and it provides many resources for the people to settle their career in various fields, so many are coming to Hyderabad city from various places of India mostly from Telangana and Andhra Pradesh states and the Hyderabad city is ranked as the best city in India in living standards by Mercer's Quality of Life Index ranking in 2017, thus many choose the city as permanent place as it gives multi careers. It is well developed in various sectors like IT, Pharma, educational etc. and it has major industrial areas in and around the city. Medchal is also one of the industrial area in city, which is carved out of erstwhile Ranga reddy district, now it is re-organized as a district by the Telangana government in 2016 named as Medchal-Malkajgiri district. Generally due to urbanization¹⁻⁵ and industrialization air and water gets pollution, especially water quality reduces, which becomes more dangerous⁶. Water is essential for human life and needs. Natural and ground water is more affected at such areas like Medchal.

II. MATERIALS AND METHODS

Samples were collected from various selected sites of Medchal-Malkajgiri district of Hyderabad city in both pre- monsoon and post monsoon seasons, general analytical methods were used to assess the water quality of samples such as Electrical Conductivity meter, pH meter, Ion meter, UV Spectrophotometer, Nephelo meter and Flame photometer was used to test the water quality parameters in both the seasons. While collecting the samples location of sampling area noted and numbering is given for the sampling bottles from 1 to 20, Latitude and Longitudes are also noted and mentioned below in the table-1.

Table1: Latitude and Longitudes values of sampling sites

S. No	Name of the site	Latitude & Longitude	S. No	Name of the site	Latitude & Longitude
1	Medchal	17.6305° N, 78.4842° E	11	Kukatpally	17.4849° N, 78.3996° E
2	Jeedimetla	17.5172° N, 78.4612° E	12	Shapur	17.5394° N, 78.2675° E
3	Shamirpet	17.5895° N, 78.5706° E	13	Fathenagar	17.4573° N, 78.4517° E
4	Kapra	17.4888° N, 78.5718° E	14	Bowenpally	17.4765° N, 78.4884° E

5	Keesara	17.5281° N, 78.6538° E	15	Uppal	17.3984° N, 78.5583° E
6	Ghatkesar	17.4453° N, 78.6853° E	16	Nagole	17.3715° N, 78.5695° E
7	Alwal	17.4981° N, 78.5027° E	17	Malkajgiri	17.4491° N, 78.5338° E
8	Quthbullapur	17.4980°N, 78.4622°E	18	Begumpet	17.4447° N, 78.4664° E
9	Dundigal	17.6269N, 78.4013° E	19	Lothukunta	17.4958° N, 78.5128° E
10	Balanagar	17.4650° N, 78.4510° E	20	Cherlapally	17.4681° N, 78.5974° E

III. RESULTS AND DISCUSSION

Water samples are analyzed in different seasons i.e. April-May month (pre- monsoon) and November-December month (post monsoon) in the year of 2016. Results are represented in the Table 2as pre- monsoon analytical data, Table 3 as post monsoon data. This data reveals that at Medchal and Balanagar have more parameters exceeding the drinking water quality limits and they are higher than all sites in or at the time of pre- monsoon, it is may be the reason that the site Medchal is having major water polluting sources i.e. many industries are located there over. Medchal and Quthbullapur are having parameters with exceeding limits than other sites in post monsoon season. At all proposed sites maximum number of parameters is exceeding the standard limits given by World Health Organization given below in table 4. Nitrate, Chloride and Total Hardness is too high at the proposed sites, excess of Fluoride is present which effects health. Total dissolved solids, Chloride, Fluoride, Nitrate and Total Hardness is compared with World Health Organization standard value sat both pre- monsoon and post- monsoon seasons and represented by graphical method at proposed sites which is shown in figure 1 to figure 5, because these parameters directly effect on human health mostly. These chemical examinations of all water samples of proposed sites given us result of drinking water and how much they polluted. The pollution causes major health problems to the people as water is major source of human living as they use this water for drinking and domestic purpose. In the month of April and May ground water levels are decreased due to summer or less rains, as ground water levels are decreased water pollution becomes more. Inpre- monsoon season water samples are more contaminated. Due to industrialization around the city of Hyderabad like Medchal, Jeedimetla, Balanagar, Kukatpally etc. water pollution increased in pre- monsoon season, it might be cause after monsoon rains also many sites arehaving pollution. The above analysis results reveal thatPre- monsoon season is having more pollution or contamination than post monsoon at selected stations.

Table 2: Analytical pre- monsoon values of water samples at proposed sites

S No	PH	EC	TDS	HCO ₃	Cl	F	NO ₃	SO ₄	Na	K	Ca	Mg	TH
1	7.84	2570	1645	153	640	2.63	58	132	209	3	192	88	840
2	7.53	1586	1015	315	240	1.85	48	51	137	3	128	44	500
3	7.67	863	552	244	90	1.73	7.1	30	25	2	96	34	380
4	7.49	583	373	190	30	1.55	10	20	25	1	48	29	240
5	7.9	568	364	215	10	2.41	94	18	30	0.5	48	24	220
6	7.5	1643	1052	392	200	0.99	8.5	105	180	30	112	29	400
7	7.45	1361	871	382	140	1.87	8.95	60	76	1	72	83	520
8	7.3	2150	1376	330	330	1.65	50	90	200	8	240	10	640
9	7.72	2000	1278	373	250	1.4	48.5	80	199	53	176	58	680
10	7.56	2550	1635	632	300	0.9	46	109	390	7	144	15	420
11	8.27	1051	673	306	90	1.09	7.02	60	105	2	40	49	300
12	8.26	790	505	205	70	0.46	68	60	35	2	40	53	320
13	8.31	1074	687	131	180	0.4	15.75	68	83	1	48	59	360
14	8.46	758	485	124	80	0.65	5	107	83	2	24	36	200
15	7.95	1625	1043	184	250	2.1	56	135	127	3	58	110	420
16	7.67	1011	648	355	60	2.6	86	50	115	1	86	74	360
17	7.99	740	474	245	50	1.73	5.35	30	43	1	72	24	280
18	8.48	463	296	87	40	1.32	2.10	51	55	3	40	15	120
19	8.08	1353	815	281	180	1.36	10.04	95	126	7	48	66	400
20	7.37	1273	866	300	130	1.66	50	72	119	4	96	54	380

Table 3: Analytical post monsoon values of water samples at proposed sites

S NO	PH	EC	TDS	HCO ₃	Cl	F	NO ₃	SO ₄	Na	K	Ca	Mg	TH
1	7.51	2700	1728	250	645	2.7	82	113	215	3	252	60	880
2	7.43	1736	1019	330	225	2.2	51	48	74	3	128	58	620
3	7.82	850	534	285	50	0.82	5.2	29.5	45	0.4	64	39	320
4	7.5	502	321	151	20	0.55	14.8	18	24	0.5	56	15	200
5	7.45	675	435	233	30	3.75	86	22	28	0.6	64	29	280
6	7.38	1655	1059	275	190	0.62	50.5	96	102	26.5	144	53	580
7	7.5	1474	943	370	180	1.56	11	65	84	1.5	112	68	560
8	7.05	2100	1345	44	490	0.63	54.85	100	100	3	264	33	840
9	7.5	1800	1155	384	200	0.86	42	84	180	60.4	104	44	440
10	7.83	1845	1180	264	80	2.21	58.6	31	86	12	44	44	340
11	7.57	1287	824	271	160	0.99	9.70	102	105	1.94	75	58	420
12	7.74	1367	875	254	190	0.42	15.95	97	115	0.8	56	19	220
13	7.42	1140	902	220	230	0.4	15.56	94	88	1	120	53	520
14	7.65	896	573	300	60	0.75	4	45	92	8	40	34	240
15	7.72	1745	797	133	110	1.75	67	54	85	2	88	34	360
16	7.41	1630	922	340	100	1.92	63	59	113	3	84	38	360
17	7.58	688	440	151	80	1.50	6.1	53	31	1	40	53	320
18	7.75	740	475	162	80	1.82	4.20	74	67	3	64	68	440
19	7.85	1410	902	234	190	0.76	26.93	95	116	0.75	32	97	480
20	8.1	1520	972	328	200	2.75	45	72	249	2.5	16	44	420

Table 4: World Health Organization (WHO) standards of drinking water quality parameters

PH	EC	TDS	HCO ₃	Cl	F	NO ₃	SO ₄	Na	K	Ca	Mg	TH
8.5	2000	500	500	200	1	45	200	200	12	75	30	200

The study of given parameters of selected sites reveals that they effected with higher contamination, the comparison is given below by graphical method, we have discussed about highly effected and health impacted parameters which are Total dissolved solids, Chloride, Fluoride, Nitrate and Total Hardness of proposed sites at both seasons and these values are compared with standard values given by World Health Organization. In the represented graphs sites were taken on X- axis and volume of parameters (mg/L) was taken on Y- axis.

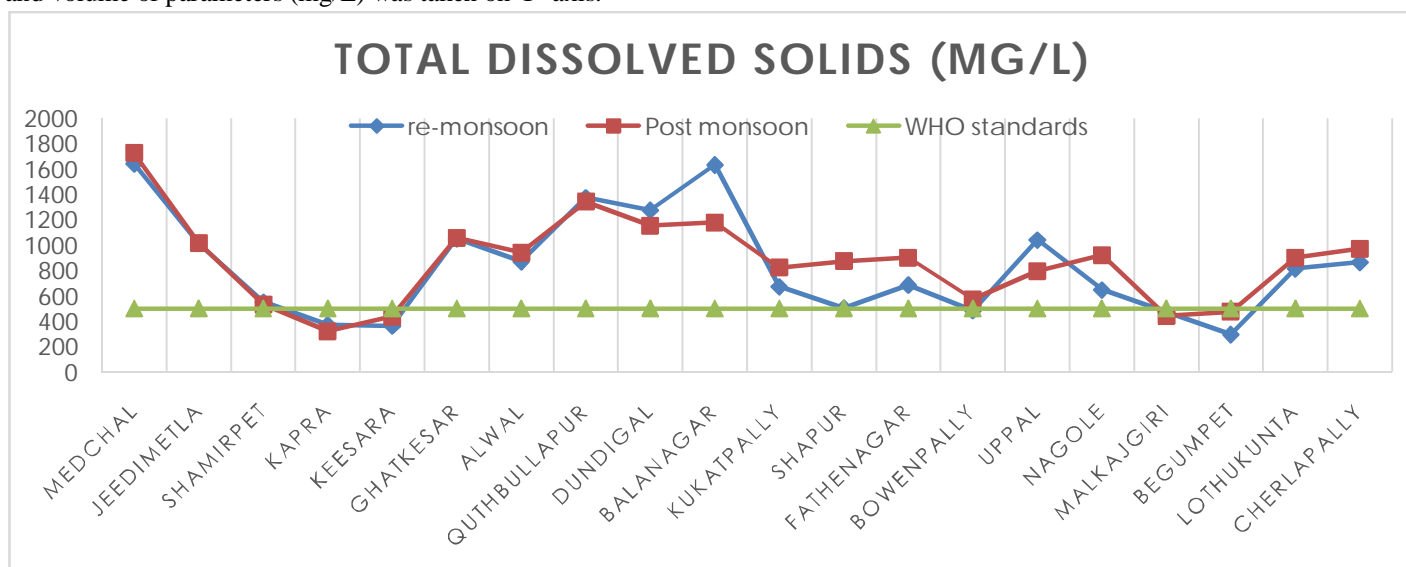


Figure1: Comparison of Total Dissolved Solids values at proposed sites

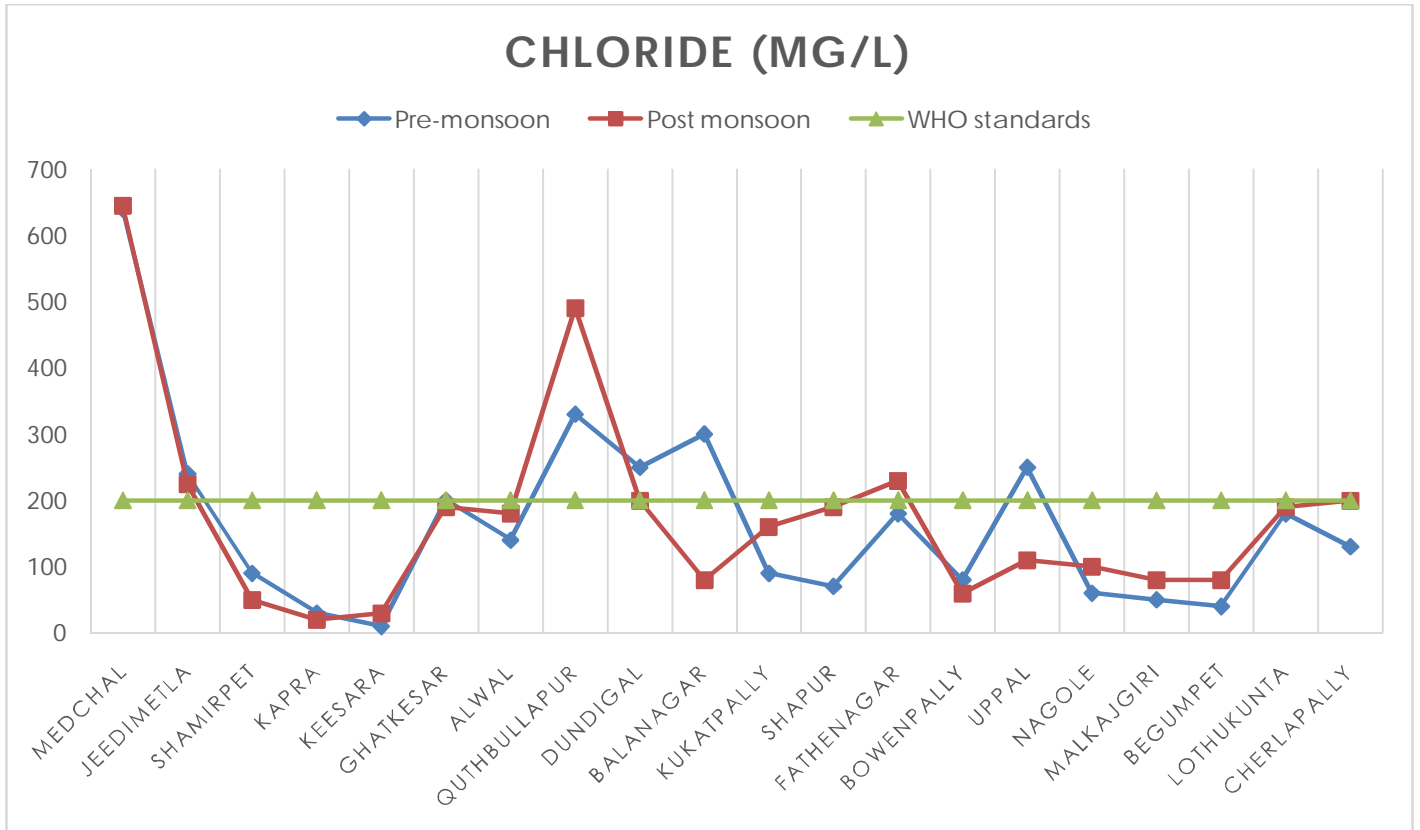


Figure 2: Comparison of Chloride values at proposed sites

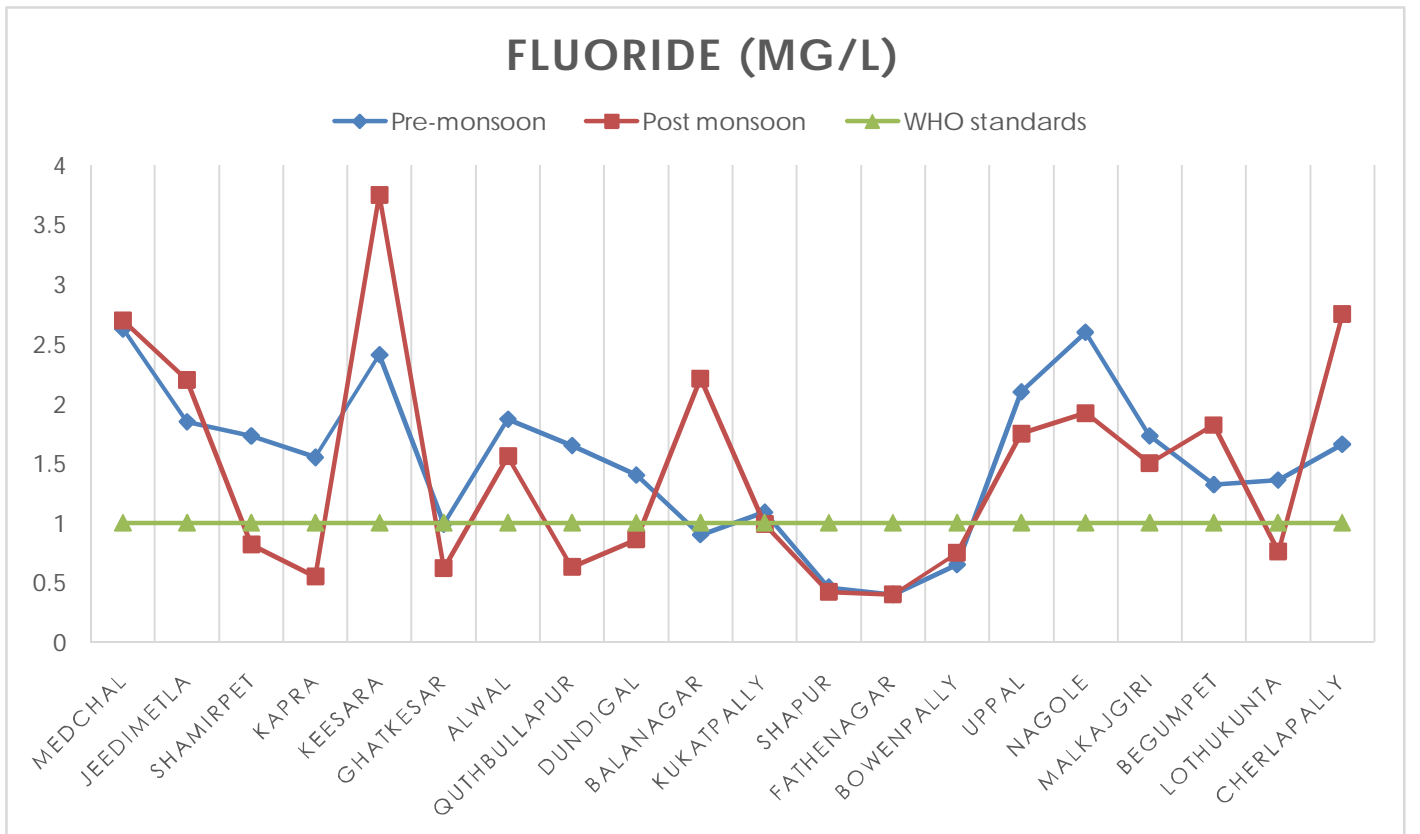


Figure 3: Comparison of Fluoride values at proposed sites

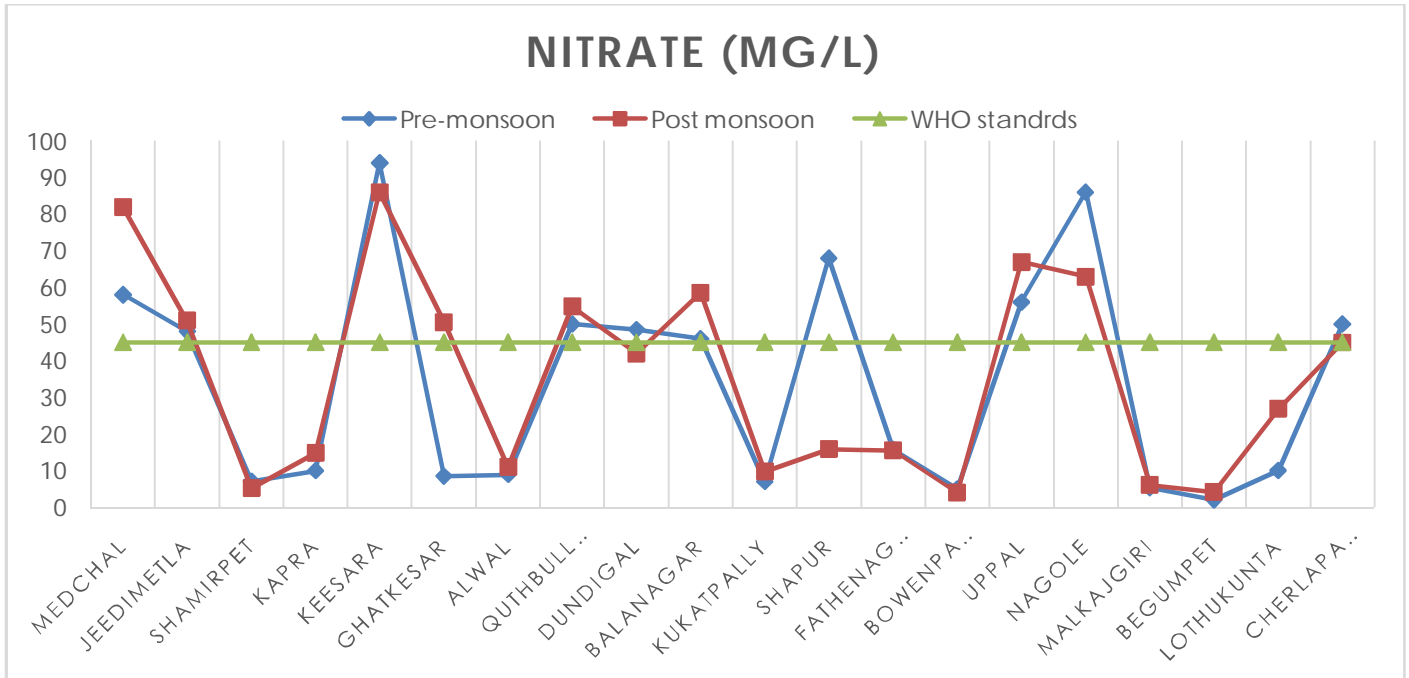


Figure 4: Comparison of Nitrate values at proposed sites

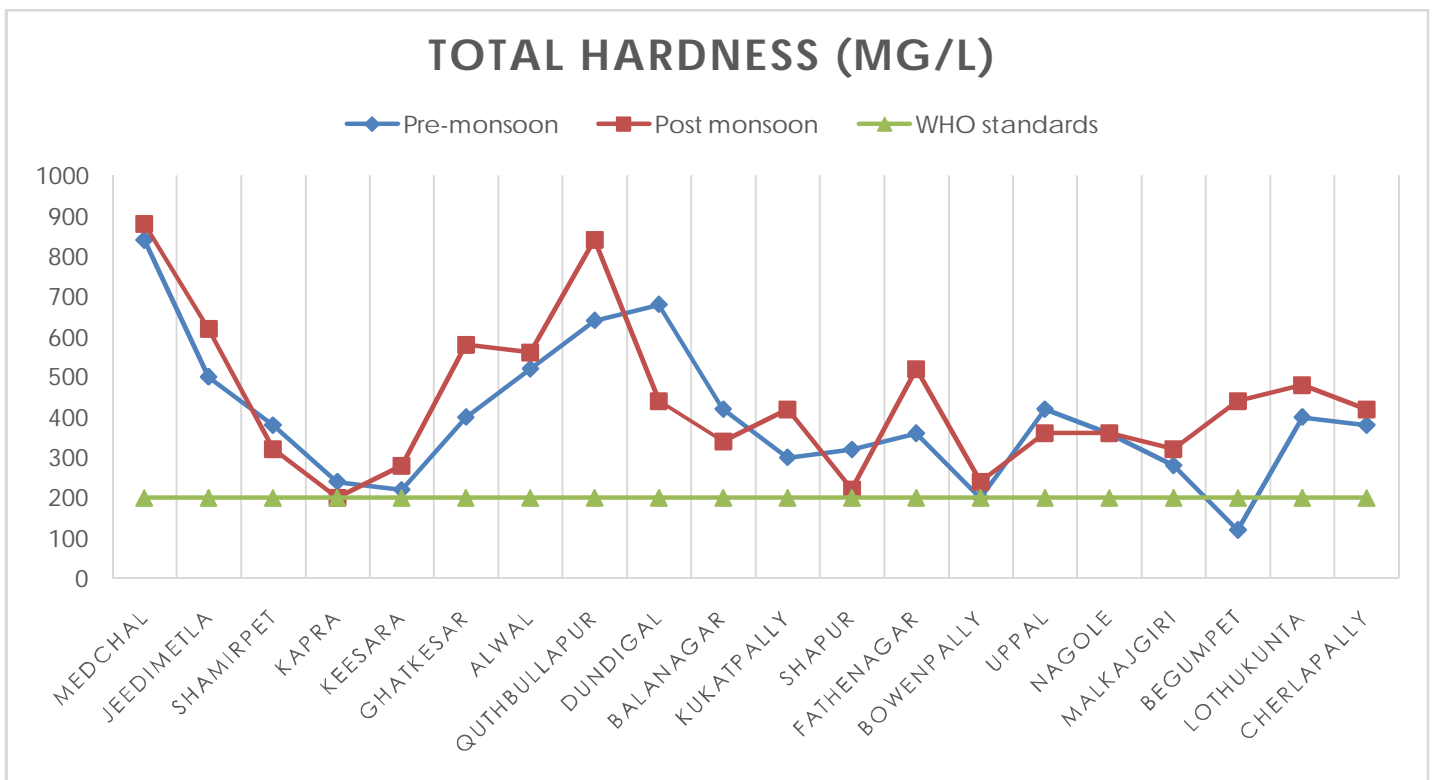


Figure 5: Comparison of Total Hardness values at proposed sites

IV. CONCLUSION

The study of chemical analysis of selected area water samples in various parameters such as pH, EC, Total Dissolved Solids (TDS), Bicarbonate (HCO_3), Chloride (Cl), Fluoride (F), Nitrate (NO_3), Sulphate (SO_4) and Total hardness (TH) are exceeded drinking water quality limits at many sites. Total dissolved solids are most at Medchal, Jeedimetla, Quthbullapur and Balanagar. High content of Nitrate is present at Jeedimetla, Quthbullapur, Balanagar, Keesara, Uppal and Nagole which is too

harmful for human health. Chloride is high contaminated at Medchal, Jeedimetla, Quthbullapur, Balanagar and Uppal. More Fluoride is present at Medchal, Jeedimetla, Quthbullapur, Balanagar, Keesara, Alwal, Uppal, Nagole and Cherlapally. Hardness is more at all sites except Kapra, Keesara, Bowenpally and Begumpet. With minor treatment to water at sites Shamirpet, Ghatkesar, Alwal, Kukatpally can be used to drink. At Medchal, Jeedimetla, Quthbullapur, Balanagar, Uppal and Nagole need more treatment, without treatment these water is not useful for domestic purpose, so the people themselves have to take care, because water is the major source for living beings and environment also effected at this condition. Hence here water polluting agents must be controlled, treatment and care should be taken. Pollution control board should actively participate to control water pollution to save health of the people and as well as responsibility has to be taken up by the government.

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