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Analysis Of Drinking Water Quality Parameters (A Case Study Of Hanumangarh Town)

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ABSTRACT
The present study has based on the analysis of drinking water quality parameters (A Case Study Of Hanumangarh Town) Due to the human and industries activities the water is contaminated. This is serious problem now a day. Thus the analysis of water quality is very important to preserve and perfect the natural eco system. The assessment of water quality index (WQI) for the drinking water of Hanumangarh Town, district Hanumangarh (Rajasthan). The present work is aimed at assessing the analysis drinking water quality of Hanumangarh Town. The water samples of all the selected stations from the wards were collected for the physicochemical analysis. For calculating present water quality status by statistical evaluation and water quality index, following 9 parameters have been considered pH, Taste, Chloride, Total Hardness, Turbidity, Odour, Taste, colour, Temperature. The obtain results are compared with Indian standard drinking water quality specification IS: 10500-2012. The study of physicochemical characteristics of this water sample suggested that the evaluation of water quality parameters as well as quality management should be carried out periodically to protect the water resources. Canals IGNP, Bhakhra canals are flowing through Hanumangarh district in Rajasthan. Water quality Parameters of these canals were analyzed in 2017-2018. Although the parameters, equality values are notice in same station.

Keywords: *Water quality parameters, Canal, Sampling Points, Hanumangarh Town*

1. INTRODUCTION
Increase in urbanization, industrialization, agricultural activity and various human activities has increase the pollution of surface water and ground water, as the safe and potable dinking water needed. Various treatment methods are adopted to rise the quality of drinking water. Water should be free from the contaminations. Organic and inorganic pollutants, Heavy metals, Pesticides etc, as well as all its parameters like pH, Total Hardness, Temperature, Turbidity, Colour, Odour, Taste, Chloride and Total Dissolved Solids should be within permissible limit.

Pure water is a chemical compound with each of its molecule (The smallest unit of compound) containing two hydrogen atoms and one oxygen atom, nothing else. However, pure water can never be available in nature. Even a man made drop of water, prepared in a laboratory by lighting the hydrogen and oxygen gases in attest tube, may not be perfectly pure, because the water drop so formed will dissolve the glass of the test tube. The precipitation, in the same manner, at the instant of its formation, contains no impurities but during the process of formation and full through the earth atmosphere. It may dissolve certain gases, trace of minerals and other substances. When once the precipitation reaches the earth surface, many more opportunities are presented for the introduction of various physical, chemical, bacterial impurities in it.

2. LITERATURE REVIEW
Kumar Manjish and Kumar Ramesh : Carried out experimental work in physicochemical properties of ground water of U.P (India). The study deals with evaluation of granite mines saturated in Jhansi

(goramachia) for their status about physico, chemical contamination of ground water. Six different sites are selected for sample testing collected from mines and urban area. Three samples have been taken at various distances on the site. This location is 10 km about from Jhansi city. The physicochemical parameters such as pH, Turbidity, DO, Temperature, Colour have been tested. It has been found that parameters are not in limit when compared with WHO standards.

Tyagi Shewta, Sharma Bhavtosh: Carried out water quality assessment in terms of water quality index at Uttrakhand (India). The study state that water quality index is valuable and unique rating to depict the overall water quality status in a single term that is helpful of selection of appropriate helpful technique to meet the concerned issue. However, WQI depicts the composite influence of different water quality parameters and communicates water quality information to the public and legislative decision makers. In spite of absence of a globally accepted composite index of water quality, some countries have used and are using aggregated water quality data in the development of water quality indices. Attempts hve been made to review the WQI criteria for the appropriateness of drinking water resources. Besides, the present articles also highlights and draw attention towards the development of a new and globally accepted. "Water Quality Index" in a specified format, which may be used at large and could represent reliable picture of water quality. Initially WQI selecting 10 most commonly used water quality variables like Dissolved oxygen, pH, TDS, Colour, Temperature has been widely applied and accepted European, African and Asian countries.

Dr. N. C. Gupta, Ms. Shikha Bhist and Mr. B. A. Patra: Carried out physicochemical analysis of drinking water quality from 32 locations in Delhi. Delhi is an old town. Which has gradually grown in to a popular city. It is one of the important business centres of India and thickly populated as well. Since the last decade, drinking water problem has created havoc in the city. In this study, we collected 32 drinking water samples throughout Delhi, Different parameters were examined using Indian Standards to find out their suitability for drinking purposes. During this examination mainly the physicochemical parameters were taken in to consideration.

Ramkrishna Ch: Carried out studies on ground water status by water quality index at Vishkhapattanam (India). Commensurate with the growth of industrial and allied activities in and around Visakhapatanam city, its area grew from 30km^2 in 1960 to over 80km^2 to date. The city's population according to 2001 census is about 1.33 million. Water supply has always been inadequate in this city with the crisis growing along with the cities progress, Today's water requirement is 360 million gallons per day. The existing Thatipudi, Gossthani, Meghadrigadda and Mudasarlovcan hardly 50% of the need. Rajwada water scheme can add a little more, therefore the supply capacity needs to be augmented. The only viable solution is to transport water from Godavari, apart from the municipal supply the population also depends upon the ground water reservoirs, groundwater quality of southern India is strongly dependent on bedrock geology and climate but may also be impacted in parts by pollution, particularly from agricultural and industrial sources.

3. MATERIAL AND METHODS

I. Study Area:

The surface water and underground water of Hanumangarh Town is used for agricultural as well as drinking purpose. In the present study many water samples were taken from different different areas from Hanumangarh Town and saw the changes in water quality parameters from source point to destination (Canal→ Water Wokas→ Tap Water).

II. The Sampling Points:

- Indira Gandhi Canal
- Source point (Water wokas).
- Site area (Tap water).

III. Sample Collection:

Potable water samples were collected from canal system of Northen Rajasthan (Indira Gandhi & Bhakra canal). These samples were collected in sterile capped containers. To avoid contamination disposable glove washed with HCl (1N) were worn during water sampling. The water containers were kept in air tight large plastic ice-cold containers and were transported to Bio technology lab within 12 hours for the further processing.

IV. Study Periods:

The study was carried out in a period of 5 months that is December, 2017, to May, 2018. The study started with the collection of water samples from the different-different areas from Hanumangarh town, with the help of sterilised test tubes. For the chemical

and physical sampling, water samples were brought to the laboratory in clean sterile test tubes and analysed with in 12 hr. These samples were taken from common water sources that is where the hole Hanumangarh Town gets its water supply. So, testing water samples from these common sources like (Canal, Water wokas, tap water), would serve the purpose and save resources.

4. PHYSICO-CHEMICAL ANALYSIS:

For the analyzed of drinking water quality parameters of the Hanumangarh Town, the physicochemical parameters which were analyzed include pH, Chloride, Temperature, Total Hardness, Colour, Taste, Odour, Turbidity, TDS (Total Dissolved Solids).

I. Parameters Included In Water Quality Assessment:

Analysis of drinking water quality parameters at Hanumangarh Town requires many parameters to be sampled. The parameters analyzed in this assessment include:

Table 1: Standard values of water sample

S. No.	Parameters	Permissible Value	Standard
1	Colour	Unobjectionable	IS: 10500
2	Taste	Agreeable	IS: 10500
3	pH	6.5 – 7.5	IS: 10500
4	Turbidity	5	IS: 10500
5	TDS	500	IS: 10500
6	TSS	5	USPHS
7	BOD	Nil – 5	USPHS
8	DO	4 – 6	USPHS
9	Total Hardness	300	IS: 10500
10	Chloride	250	IS: 10500
11	Alkalinity	120	USPHS
12	Residual Chlorine	0.2	IS: 10500

(Except pH and Turbidity values other parameters are in mg/L)

USPHS Standards for United States Public Health Service.

5. RESULTS AND DISCUSSION:

In order to explore physicochemical study of drinking water quality parameters in different areas at Hanumangarh Town in Hanumangarh district, Rajasthan. Experiment were conducted and observed with respect to the analysis of physicochemical parameters.

I. Temperature:

The temperature of water reveals almost uniform magnitude in all the study samples and it is lying from tap water (96.20 F-97.0 F) canal water (94.80 F-96.40 F) and source point water (96.0 F-98.20 F). The fluctuations in optimum temperature may lead on increases and decreases on the change of weather, results are shown in table No2 and chart No1.

Table 2: Temperature Results of water sample

Water temperature in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	97.40 F	94.80 F	98.20 F
Water temperature in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	96.20 F	95.7 F	96.10 F
Water temperature in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	96.30 F	95.90 F	96.0 F
Water temperature in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	97.00 F	96.40 F	96.20 F
Water temperature in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	96.80 F	95.80 F	96.10 F
Water temperature in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	96.20 F	95.70 F	95.80 F
Water temperature in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	96.30 F	95.90 F	96.00 F

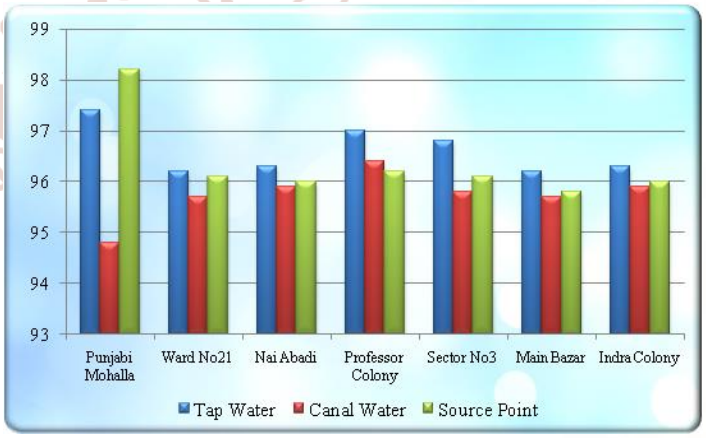

Chart 1: Graphical representation of temperature (Degree F°)

II. Total Hardness:

As per IS: 10500-2012. Desirable limit and permissible limit for hardness is lies between 200 to 600 mg/l respectively. The degree of hardness of

drinking water has been classified in terms of the equivalent $CaCo_3$ concentration as follows:

Table 3: Standard values of drinking water hardness

Hardness Mg/l	Type
0-17	Soft
17-60	Slightly Hard
60-120	Moderating Hard
120>180	Hard
180	Very Hard

The hardness of water reveals almost uniform magnitude in all the study samples and it is lying from tap water (14-19) mg/l canal water (19-22) mg/l and source point water (13-16) mg/l.

The results are shows in table No4 and Chart No2

Table 4: Hardness results of water sample

Water Hardness in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	15	20	13.80
Water Hardness in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	16.20	19.50	14.30
Water Hardness in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	14.70	19.10	14.00
Water Hardness in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	16.50	22.0	15.20
Water Hardness in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	18.10	21.80	15.90
Water Hardness in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	17.20	21.90	14.90
Water Hardness in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	16.90	20.90	15.10

The hardness is in mg/l

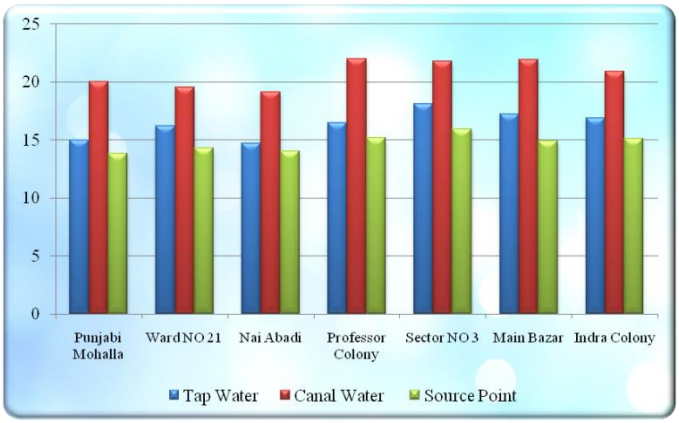

Chart 2: Graphical representation of hardness

The hardness is in mg/l

III. Turbidity:

The standard turbidity is 5 NTU. Measurement of turbidity reflects the temporary in water. It is caused by the substances present in water in suspension. In natural water, it is caused by clay, salts, slit, organic matter in organic matter and other microscopic organism. It is range from less than 2 NTU is excellent. However the prescribed limit is 5 NTU (IS: 10500).

We can see the turbidity within our simple eyes. Turbidity was found within permissible limit the results are shown table No5 and chart no 3.

Table 5: Turbidity results of water sample

Water Turbidity in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	0.80	1.85	0.60
Water Turbidity in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	0.80	1.85	0.60
Water Turbidity in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	1.0	3.5	1.10
Water Turbidity in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	0.87	2.87	0.75
Water Turbidity in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	0.85	2.45	1.20
Water Turbidity in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	0.80	2.10	1.15
Water Turbidity in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	1.20	1.80	1.40

Turbidity unit is NTU (Nephelo matric turbidity unit)

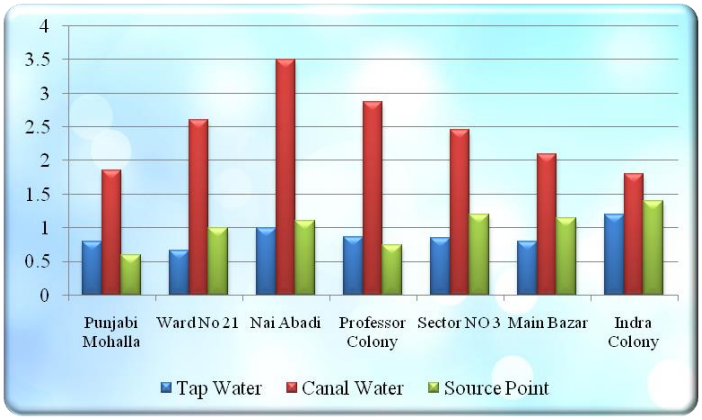

Chart 3: Graphical representation of turbidity

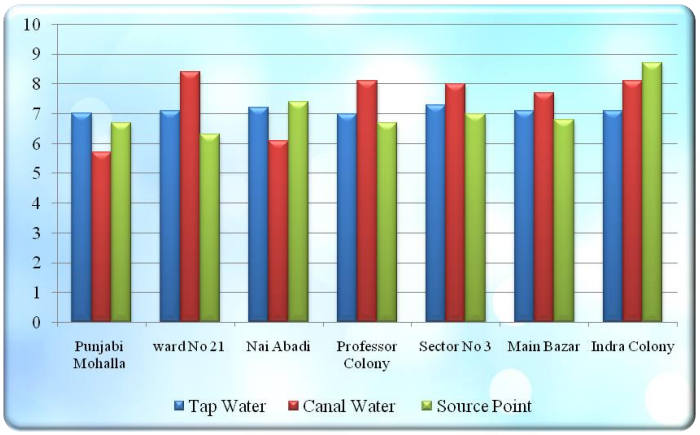

Chart 4: Graphical Representation Of pH of water

IV. pH:

The standard range of pH is 6.5-8.5. The pH is measure of the intensity of acidity and measure of the concentration of hydrogen ions in water. Below 4.0 will produce sour taste and higher than 8.5 shows alkaline taste. The results shown in table No 4 and chart No 4.

Table 6: pH results of water sample

The pH in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.01	5.7	6.70
The pH in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.10	8.40	6.30
The pH in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.20	6.10	7.40
The pH in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.0	8.10	6.70
The pH in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.30	8.0	7.0
The pH in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.10	7.70	6.80
The pH in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	7.10	8.10	6.70

V. TDS: (Total Dissolved Solids):

Table 7: Standard value of TDS

Less then 300	**Excellent**
300-600	Good
600-900	Fair
900-1200	Poor
1200-1500	Not Desirable

Total dissolved solids may be considered as salinity indicator for classification of groundwater. The TDS in groundwater is due to the presence of calcium, magnesium, sodium, potassium, bicarbonate, chloride ions. In the study area TDS varies from tap water (500-550) mg/l, canal water (550-620) mg/l, and source point (530-570) mg/l, All the water samples have TDS concentration was under the prescribed limit. The results have shown in table N0 8 and chart No 4.

Table 8: TDS results of water sample

TDS in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	510	615	540
TDS in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	525	595	547
TDS in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	512	602	552
TDS in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	524	622	574
TDS in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	502	559	543
TDS in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	520	610	570

TDS in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	500	580	545

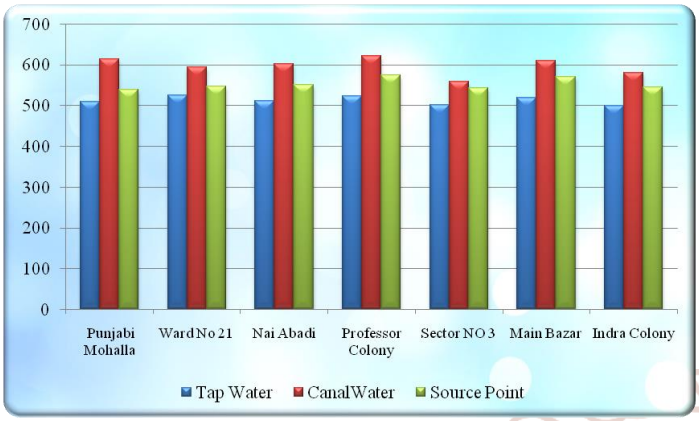

Chart 5: Graphical Representation of TDS of water

VI. Taste: Basically taste is inoffensive.

Table 9: Taste results of water sample

Taste results in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless
Taste results in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless
Taste results in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless
Taste results in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless
Taste results in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless
Taste results in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless
Taste results in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Tasteless	Desirable	Tasteless

VII. Odour:

Basically odour is inoffensive. An odour is always caused by one or more compounds.

Table 10: Odour results of water sample

Odour results in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Mostly Odour	Slightly
Odour results in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Mostly Odour	Slightly
Odour results in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Mostly Odour	Slightly
Taste results in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Mostly Odour	Odour less
Odour results in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Slightly	Odour less
Odour results in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Mostly Odour	Odour less
Odour results in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Odour less	Slightly	Odour less

VIII. Colour:

Basically colour is identified with eyes view. The colour of water with the ambient conditions in which that water is present. While relatively small quantities of water appear to be colourless. Colour is appeared due to the reason of dissolved and suspended components.

Table-11: Colour results of water sample

Colour results in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Colour less	Yellowish	Colour less
Colour results in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Colour less	Yellowish	Colour less
Colour results in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Colour less	Brownish	Colour less
Colour results in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Colour less	Yellowish	Colour less
Colour results in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Colour less	Sandy	Colour less
Colour results in sector-6 (Main Bazar)			
Sr. No.	Tap water	Canal water	Source point
1.	Colour less	Brownish	Colour less
Colour results in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	Colour less	Sandy	Colour less

IX. Chloride:

In the study area there is much changes in different-different samples it is ranged tap water (67-75) mg/l, canal water (54-68) mg/l, source point (65-82) mg/l. The permissible value is under the 250 mg/l.

Table 12: Chloride results of water sample

Chloride results in sector-1 (Punjabi mohalla)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	74	54	82
Chloride results in sector-2 (Ward No 21)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	77	59	82
Chloride results in sector-3 (Nai Abadi)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	69	57	79
Chloride results in sector-4 (Professor Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	71	55	75
Chloride results in sector-5 (Sector-3)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	74	62	71
Chloride results in sector-6 (Main Bazar)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	68	64	65
Chloride results in sector-7 (Indra Colony)			
Sr. No.	**Tap water**	**Canal water**	**Source point**
1.	75	67	71

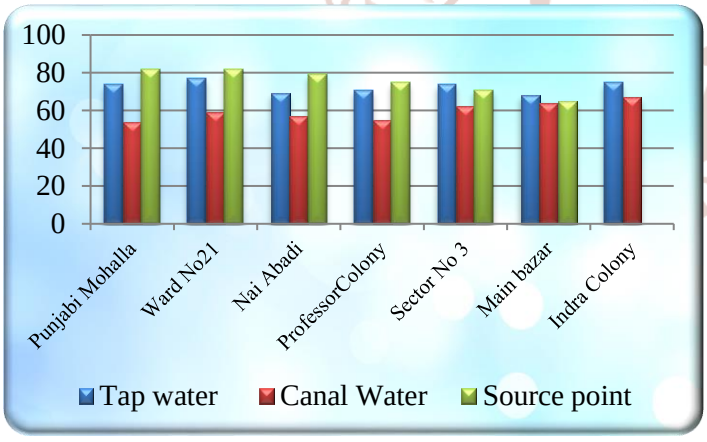

Chart 6: Graphical representation of chlorides of water

6. CONCLUSION

Water quality is dependent on the type of pollutant added and the nature and mineral found in particular zone of drinking water. Monitoring of drinking water quality of is done by collecting representative water samples and analysis of physicochemical characteristics of water samples at different locations of Hanumangarh city. The nine parameters were analyzed different different seven locations.

The following results can be draw with the current study was:

- It was observe the all the almost parameters in permissible limits.
- Some where the pH concentration goes low.
- In the month of April water got turbulence due to the polluted water from industries from Punjab state.
- Sometimes water temperature increase due to the impurities of water CO_2 had increased.
- The water parameter (TDS) in totally under the permissible limit.

The outcome of the study can help a develop water quality awareness culture and practice in present as well as in future generation.

So this study will helpful to many water quality analysts as ell as biologist, ecologist and environmentalists also very useful to Public Health department and Municipal corporation to improve public health in epidemiological issues.

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