

Screening of Fluoride Level in Student Living in Tribal Hostel in and around Udaipur**Hemant Dashora¹, Monica Gaur², Shefali Mehta³, A. K. Verma⁴, Shuchi Goyal⁵, Vishwa Mehta⁶**¹Senior Resident, Department of Biochemistry, RNT Medical College, Udaipur, Rajasthan, INDIA²Assistant Professor, Department of Pharmacology, Government Medical College, Pali, Rajasthan, India³Associate Professor, Department of Biochemistry, Pacific Medical College and Hospital-Bedla, Udaipur, Rajasthan, India⁴Senior Professor and Head, Department of Biochemistry, RNT Medical College, Udaipur, Rajasthan, India⁵Professor, Department of Biochemistry, RNT Medical College, Udaipur, Rajasthan, India⁶Intern, Geetanjali Medical College and Hospital, Udaipur

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Abstract**Background:** The most of the fluoride in water is naturally occurring or available in added form of the free fluoride ion. The level of fluoride higher from 8mg/litter is having a significant harm on the body of an individual and leading to issues in urine. However, there are different technologies are available for maintaining and managing the level of fluoride in water but the lack of education and facilities in the rural and tribal areas is having a negative impact on the health of the people who are drinking the groundwater.**Aim:** The current study aims to screening of Fluoride Level in Student Living in Tribal Hostel in and around Udaipur**Method:** The study was conducted using the cross sectional design at Department of Biochemistry, R.N.T Medical College Udaipur, Rajasthan. The study has included 150 students who were exposed to drinking water in tribal hostels in Udaipur district Rajasthan. For the study 150 subjects were considered from tribal hostel and the prior consent were taken to take active participation. After collecting the consent, 5ml of urine samples were collected for biochemical analysis. Moreover, the complete physical and history analysis was done to understand the BMI of the individual. The statistical analysis of data was data using the SPSS version 21. It involves the mean, standard deviation, T-test, ANOVA and Chi-square.**Results:** According to analysis, the mean age, height and weight, as well as BMI of participants, were 14.99±1.88, 1.36±0.17, 36.17±7.40 and 19.89±4.53 respectively. In addition to this, there were 53.3% male and 44.7% female participants. Moreover, the most numbers of participants 34.6% were drinking water from bore-well and followed by 33.3% open well and 22% RO. The mean value of urine fluoride was 0.92±0.64. Apart from this, there was a significant association was found between urine fluoride and gender as P< 0.05.**Conclusion:** From the study, it has been carried out that underground water in Udaipur district is having fluoride contaminated and analysis has suggested that urine fluoride ranging between 0.2 to 3.2.**Keywords:** Fluoride, Urine, R.O.

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Introduction

There are different types of health issues that caused by the natural contaminants. The groundwater is containing various contaminates that have a significant impact on the health of the individual[1] According to the analysis, fluoride is one of the major contaminants that found in different concentration in groundwater and lead to many disease[2] High consumption of higher fluoride concentration waster is having a direct impact on the nervous system and urine issues[3] According to

clinical analysis, 60% of adults absorbed fluoride is excreted in urine by the kidneys and 45% of children having this problem[4]. Kidney is accumulating higher fluoride than any other organs in the human body and affecting the health of the individual[5,6]. The removal of fluoride, it is essential for an individual to improve the diet plan and maintain the derangements[7].

According to the analysis, the most of the fluoride in water is naturally occurring or available in added

form of the free fluoride ion[8] The level of fluoride higher from 8mg/litter is having a significant harm on the body of an individual and leading to issues in urine[9,10]. However, there are different technologies are available for maintaining and managing the level of fluoride in water but the lack of education and facilities in the rural and tribal areas is having a negative impact on the health of the people who are drinking the groundwater[11,12]. Now, to understand and analyze the issues relate to fluoride that affecting the urinary function is essential to create the awareness in tribal regions of Rajasthan, India. The outcome of study will be helpful for identification of causes and offering the recommendations to minimize the problems for the people.

Aim

The current study aims to screening of Fluoride Level in Student Living in Tribal Hostel in and around Udaipur

Material and method

Study design and place

The study was conducted using the cross sectional design at Department of Biochemistry, R.N.T Medical College Udaipur, Rajasthan. The study has included 150 students who were exposed to drinking water in tribal hostels in Udaipur district Rajasthan. The study was approved by the Ethical Committee and consent from the participants. The inclusion criteria of study were students who were living in the hostel in and around Udaipur Rajasthan. The

exclusion criteria were students who refused to take part in the study.

Methods

For the study 150 subjects were considered from tribal hostel and the prior consent were taken to take active participation. After collecting the consent, 5ml of urine samples were collected for biochemical analysis. Moreover, the complete physical and history analysis was done to understand the BMI of the individual. The investigations that were done with the participants involve the drinking water fluoride and urine fluoride using the ion selective electrode. Moreover, the fluoride level was analyzed using the Thermo Scientific Orion Fluoride Ion Selective Electrode analyzer. Apart from this, complete blood count was evaluated in 5-part analyzer and liver and renal functions were evaluated in Siemens RXL fully auto analyzer using Flext reagent cartridges.

Statistical analysis

The statistical analysis of data was data using the SPSS version 21. It involves the mean, standard deviation, T test, ANOVA and Chi-square.

Results

According to analysis, the mean age, height and weight, as well as BMI of participants, were 14.99 ± 1.88 , 1.36 ± 0.17 , 36.17 ± 7.40 and 19.89 ± 4.53 respectively. In addition to this, there were 53.3% male and 44.7% female participants.

Table 1: Sources of drinking water at hometown and hostel

Source of drinking water at hometown and hostel	N	Percent
R.O.	33	22
Borewell	52	34.6
Hand Pump	15	10
Open Well	50	33.3
Total	150	100.0

According to analysis of table, the most numbers of participants 34.6% were drinking water from bore-well and followed by 33.3% open well and 22% RO.

Table 2: Dental Motling

Dental Motling	N	Percent
No	75	50.0
Yes	75	50.0
Total	150	100.0

According to the table 2, dental mottling was found among 50% of the participants.

Table 3: Urine Fluoride (mg/L)

	N	Minimum	Maximum	Mean	Std. Deviation
Urine Fluoride (mg/L)	150	0.16	3.10	0.9220	0.64372

As per the analysis of table 3, the mean value of urine fluoride was 0.92 ± 0.64 .

Table 4 : Urine Fluoride

Urine Fluoride	N	Percent
Low	1	0.7
Normal	149	99.3
Total	150	100.0

According to the outcome of table 4, urine fluoride was identified normal among 99.3% participants.

Table 5: Urine Fluoride (mg/L) and Gender

	Gender	N	Mean	Std. Deviation	P-value
Urine Fluoride (mg/L)	Male	83	0.7094	0.46254	0.000
	Female	67	1.1854	0.73648	

According to analysis of table 5, there was a significant association was found between urine fluoride and gender as $P < 0.05$.

Table 6: Mean Urine Fluoride (mg/L) and BMI

BMI	N	Mean Urine Fluoride (mg/L)	Std. Deviation	P-value
Under Weight	70	0.9606	0.70340	0.649
Normal	56	0.8468	0.54792	
Overweight	21	1.0171	0.69876	
Obese	3	0.7600	0.56321	
Total	150	0.9220	0.64372	

According to above table, there was no significant differences were identified between the BMI variables and urine fluoride as $P > 0.05$.

Table 7: BMI categories and Urine fluoride

(I) BMI Category	(J) BMI Category	Mean Difference (I-J)	Sig.
Under Weight	Normal	0.11379	0.760
	Overweight	-0.05657	0.985
	Obese	0.20057	0.953
Normal	Under Weight	-0.11379	0.760
	Overweight	-0.17036	0.732
	Obese	0.08679	0.996
Overweight	Under Weight	0.05657	0.985
	Normal	0.17036	0.732
	Obese	0.25714	0.917
Obese	Under Weight	-0.20057	0.953
	Normal	-0.08679	0.996
	Overweight	-0.25714	0.917

According to analysis of table 7, there was a statistically significant difference identified with all BMI categories and urine fluoride a $P < 0.05$.

Table 8: Urine fluoride and dental mottling

Dental Motling	N	Mean Urine Fluoride (mg/L)	Std. Deviation	P-value
No	75	0.5628	0.38709	0.000
Yes	75	1.2812	0.65036	

According to analysis of table, there was a significant association was identified between urine fluoride and dental mottling as $P > 0.05$.

Table 9: Mean Urine fluoride and source of drinking water at hometown and hostel

Source of drinking water at hometown and hostel	N	Mean Urine Fluoride (mg/L)	Std. Deviation	P-value
R.O.	33	.6300	0.69782	0.364
Borewell	52	.5300	0.38184	
Hand Pump	15	1.0282	0.73163	
Open Well	50	.9240	0.67525	
Total	150	.9220	0.64372	

According to analysis of table, there was no significant differences identified among the drinking water at home town and hostel and mean fluoride as $P > 0.05$.

Table 10: Mean Urine Fluoride (mg/L) and PALLOR

Pallor	N	Mean Urine Fluoride (mg/L)	Std. Deviation	P-value
No	102	0.6507	0.36285	0.000
Yes	48	1.4985	0.72904	

According to analysis, there was no significant difference identified between mean urine fluoride and pallor as $P < 0.05$.

Discussion

Fluoride is one of the major contaminants that found in different concentration in groundwater and lead to many disease. High consumption of higher fluoride concentration water is having a direct impact on the nervous system and urine issues. According to clinical analysis, 60% of adults absorbed fluoride is excreted in urine by the kidneys and 45% of children having this problem.

According to analysis, the mean age, height and weight as well as BMI of participants were 14.99 ± 1.88 , 1.36 ± 0.17 , 36.17 ± 7.40 and 19.89 ± 4.53 respectively. In addition to this, there were 53.3% male and 44.7% female participants. Moreover, the most numbers of participants 34.6% were drinking water from bore-well and followed by 33.3% open well and 22% RO. The mean value of urine fluoride was 0.92 ± 0.64 . Apart from this, there was a significant association was found between urine fluoride and gender as $P < 0.05$. Additionally, there was no significant difference identified between mean urine fluoride and pallor as $P < 0.05$.

As per the outcome of the study of Wu et al., (2021)[13] the higher percentage of BMI was underweight 48% and it was similar to current study. Moreover, the 18% of the participants of study of Wu et al., (2021) were drinking the R.O. water and rest of participants were drinking the bore-well water. The dental mottling was founded among the 52% participants. However, the level of urine fluoride was almost similar to the current study.

Moreover, the study of Santiago-Saenz et al., (2022)[14] has suggested that differences in participant's socio-demographic characteristics, urinary iodine, urinary lead, and urinary arsenic levels were statistically not significant ($P > 0.05$). However, a statistically significant difference was observed in the urinary fluoride levels ($P < 0.000$)[15].

Conclusion

From the study, it has been carried out that underground water in Udaipur district is having fluoride contaminated and analysis has suggested that urine fluoride ranging between 0.2 to 3.2. Moreover, it has been carried out that there was significantly higher urine fluoride in patients and to overcome the issue it is essential to offer the facility of R.O. in their hostel and hometown.

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