

**3<sup>rd</sup> International Seminar  
on Hydrology and  
Meteorology,  
Sept.15 and 16, 2014 HICC,  
Hyderabad**

**WELCOME TO ALL**

**NAMASTAE ↔ JOHAR**

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**TOPIC : EFFECT OF FLUORIDE ON HEALTH  
OF TEETH OF SCHOOL CHILDREN IN  
BARKAGAON, HAZARIBAG, JHARKHAND,  
INDIA**

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## **INTRODUCTION**

- **WATER IS MOST ESSENTIAL THING FOR THE ENTIRE LIVING SYSTEM.**
- **ABOUT 3% WATER IS PRESENT IN SURFACE AND UNDEGROUND OUT OF WHICH 1% IS POTABLE.**
- **DUE TO POPULATION EXPLOSION, MODERNIZATION AND ANTHROPOGENIC ACTIVITIES INCLUDING EXCESS MINERAL EXPLORATION, THE POTABLE WATER BECOMING UNFIT FOR USE.**
- **MORE THAN 80% DISEASES OF MANKIND IS WATERBORNE (WHO, 1996)**
- **FLUORIDE, ONE OF THE MOST ESSENTIAL ELEMENTS FOR CALCIFICATION OF BONES AND TEETH, IF TAKEN WITHIN A PERMISSIBLE LIMIT (1.5mg/lit)**

**CONT.**

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- ❑ **EXCESS FLUORIDE INTAKE MAY CAUSE DENTAL FLUOROSIS.**
- ❑ **WATER IS UNIVERSAL SOLVENT, DISSOLVES THE MINERALS OF ROCKS DURING ITS PASSAGE AND STORAGE, ULTIMATELY CHANGING THE QUALITY OF POTABLE WATER.**
- ❑ **EXCESS FLUORIDE IS GLOBAL PROBLEM INCLUDING OUR COUNTRY.**
- ❑ **200 DISTRICTS OF 20 STATES OF INDIA ARE SUFFERING FROM FLUOROSIS (Kumar and Sadhu, 2013)**
- ❑ **IN JHARKHAND LITTLE STUDY HAS BEEN DONE ON THE OCCURANCE OF FLUORIDE IN POTABLE WATER AND ITS IMPACT ON TEETH.**
- ❑ **IN VIEW OF ABOVE THE PRESENT STUDY HAS BEEN UNDERTAKEN AMONG SCHOOL CHILDREN BETWEEN 06-11 YEARS IN SOME TRIBAL DOMINATED AREA.**

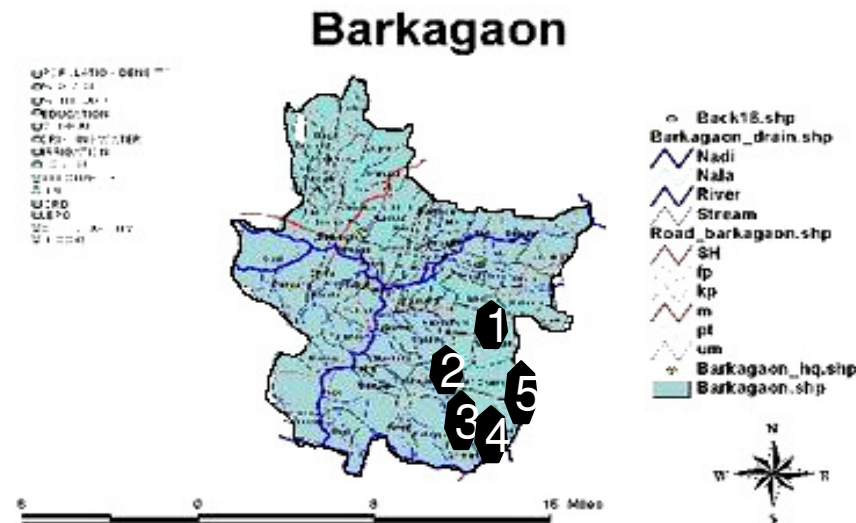
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## STUDY AREA

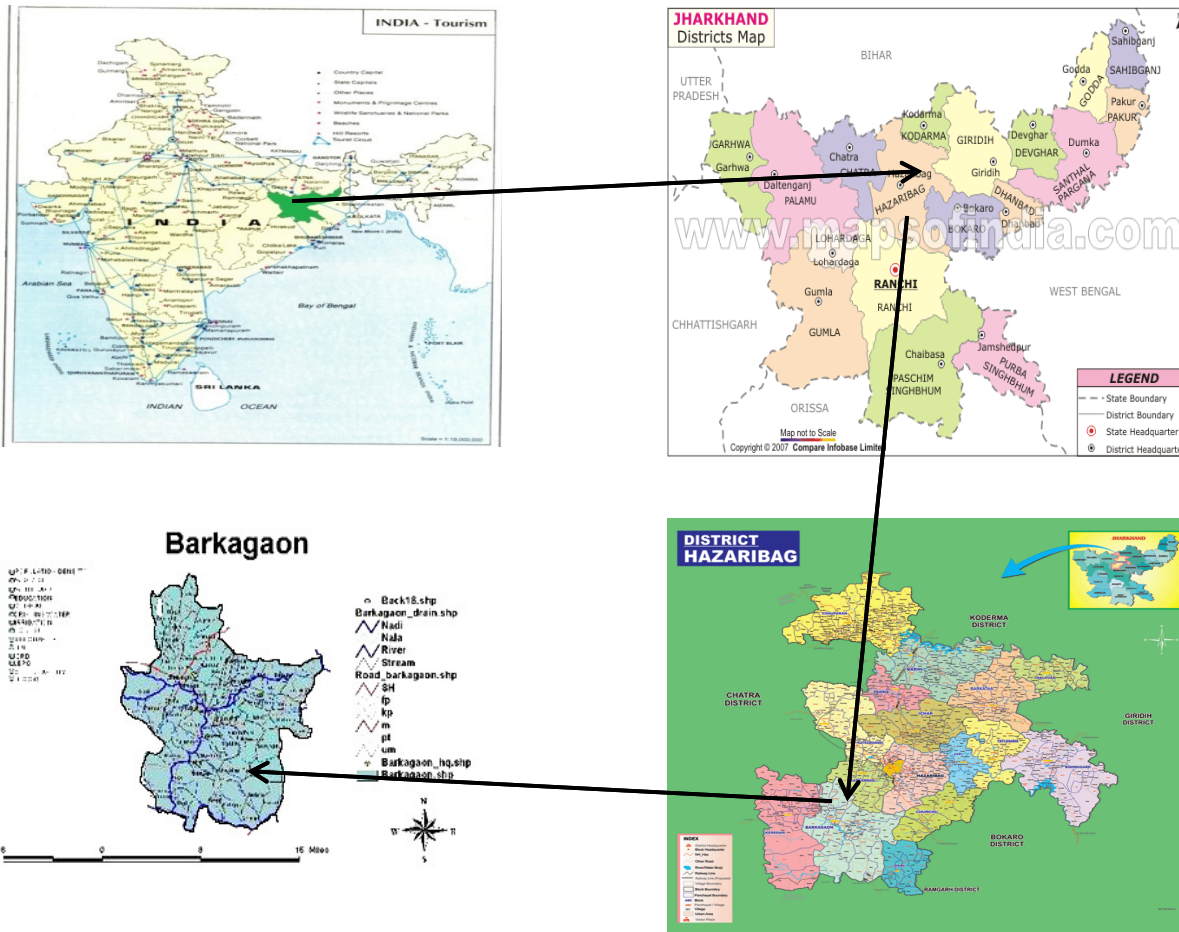
STUDY AREA, BARKAGAON AND ITS SURROUNDING IS LOCATED AT 23°52'5" N LATITUDE AND 84° 14'15" E LONGITUDE AS SHOWN IN MAP (1,2,3,4 AND 5 SHOWING THE LOCATION OF THE STUDY AREA).



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Showing the location of the Study area (23<sup>o</sup> 52' 5" N latitude and 85<sup>o</sup> 14' 15" E longitude (Not to scale)



## **MATERIAL METHOD**

PROTOCOL OF APHA, 2005 HAS BEEN FOLLOWED AND THE DENTAL HEALTH OF THE CHILDREN WAS COMPARED WITH DEAN'S INDEX.

**CONT.**

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## RESULT

**Table-1: Showing the seasonal variation of fluoride content in ground water**

Season	Month	Site of Sampling				
		Mean+S.E. in mg.	Mean+S.E. in mg.	Mean+S.E. in mg.	Mean+S.E. in mg.	Mean+S.E. in mg.
		SITE - I	SITE - II	SITE - III	SITE - IV	SITE - V
<b>Rainy</b>	July 11	2.10±0.7	2.35±0.8	2.40±0.7	2.50±0.7	2.15±0.7
	Aug 11	1.75±0.7	1.94±0.6	1.70±0.8	1.90±0.8	1.65±0.8
	Sept 11	1.80±0.6	1.73±0.7	1.96 ±0.6	2.15±0.7	1.95±0.5
	Oct 11	2.73±0.6	1.95±0.6	2.63 ±0.6	2.10±0.7	2.28±0.7
	<b>AV:Values</b>	<b>1.89±0.8</b>	<b>1.99±0.7</b>	<b>2.04±0.6</b>	<b>2.16±0.8</b>	<b>1.98±0.7</b>
<b>Winter</b>	Nov 11	2.02±0.7	2.85±0.8	2.34±0.7	2.96±0.8	2.41±0.7
	Dec 11	1.92±0.7	2.90±0.8	2.72±0.8	3.70±0.8	2.64±0.7
	Jan 12	2.16±0.7	3.17±0.9	2.87±0.8	3.92±0.9	2.90±0.8
	Feb 12	2.39±0.7	3.35±0.9	3.51±0.9	3.39±0.9	3.23±0.9
	<b>AV:Values</b>	<b>2.12±0.7</b>	<b>3.06±0.9</b>	<b>2.86±0.8</b>	<b>3.49±0.9</b>	<b>2.79±0.8</b>
<b>Summer</b>	March 12	2.52±0.7	3.46±0.9	3.32±0.8	3.61±0.9	3.54±0.9
	April 12	2.91±0.8	3.64±0.9	3.75±0.8	3.88±0.9	3.79±0.8
	May 12	3.00±0.7	3.25±0.8	2.70±0.7	3.10±0.7	2.77±0.7
	June 12	3.35±0.7	4.90±0.9	4.53±0.9	4.80±0.7	3.92± 0.7
	<b>AV:Values</b>	<b>2.94±0.7</b>	<b>3.81±0.8</b>	<b>3.57±0.8</b>	<b>3.84±0.8</b>	<b>3.50±0.8</b>



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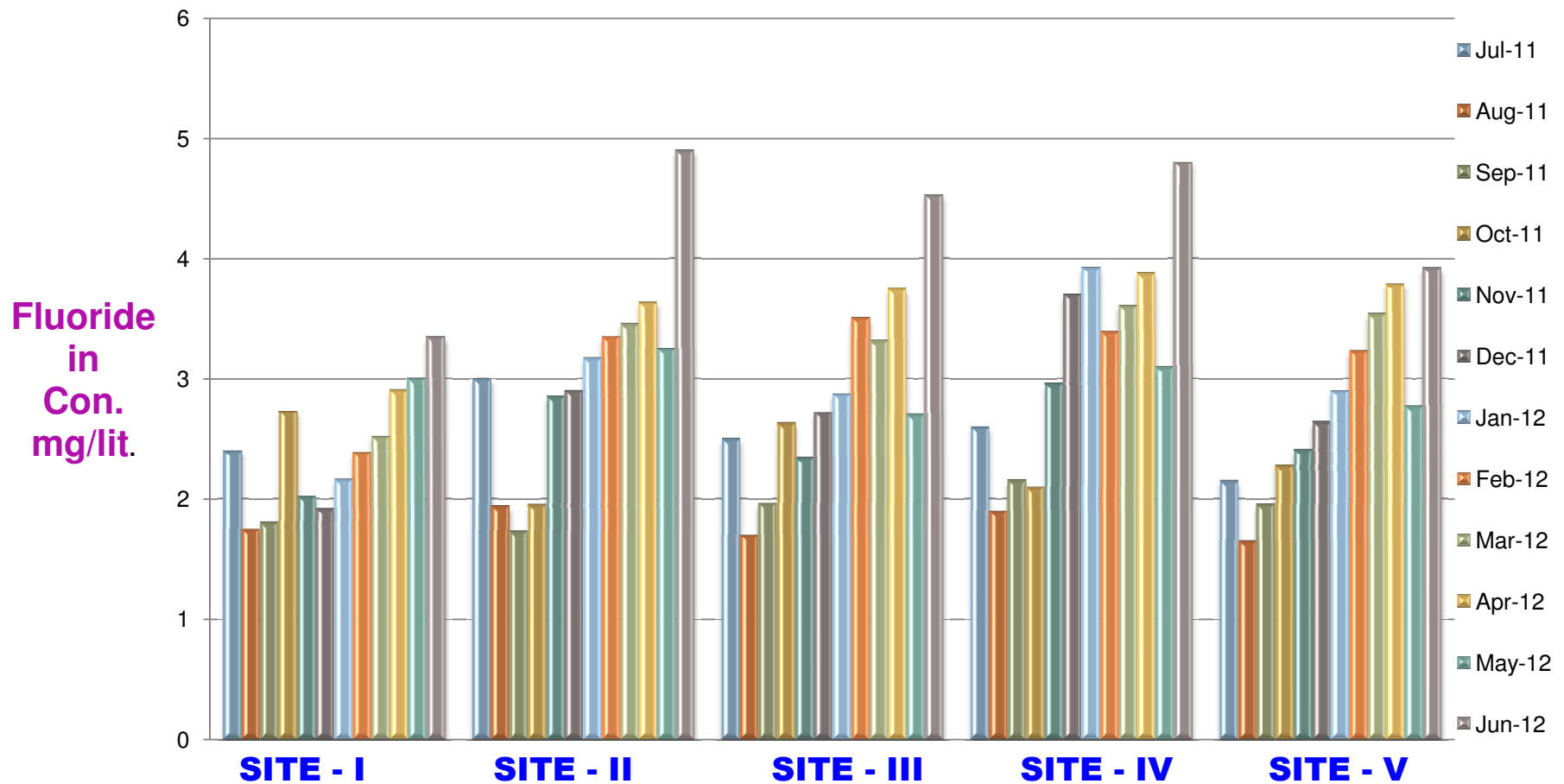
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**Table-2: Showing the percentage occurrence of fluoride - affected teeth of children as per Dean's Index**

Sl. No.	Site of Sampling	Number of cases (06-11 yrs)	Dean's Index					
			Normal	Questionable	Very mild	Mild	Moderate	Severe
<b>01.</b>	<b>SITE - I</b>	<b>114</b>	<b>21.05%</b>	<b>18.42%</b>	<b>16.67%</b>	<b>19.30%</b>	<b>11.40%</b>	<b>13.16%</b>
<b>02.</b>	<b>SITE - II</b>	<b>84</b>	<b>8.34%</b>	<b>11.90%</b>	<b>28.58%</b>	<b>25%</b>	<b>19.04%</b>	<b>7.14%</b>
<b>03.</b>	<b>SITE - III</b>	<b>88</b>	<b>10.22%</b>	<b>12.50%</b>	<b>30.69%</b>	<b>25%</b>	<b>14.78%</b>	<b>6.81%</b>
<b>04.</b>	<b>SITE - IV</b>	<b>77</b>	<b>7.79%</b>	<b>19.48%</b>	<b>18.18%</b>	<b>23.38%</b>	<b>20.78%</b>	<b>10.39%</b>
<b>05.</b>	<b>SITE - V</b>	<b>63</b>	<b>14.28%</b>	<b>11.11%</b>	<b>20.64%</b>	<b>28.58%</b>	<b>19.08%</b>	<b>6.35%</b>
<b>Total Percentage of F- affected teeth</b>			<b>12.91%</b>	<b>15.02%</b>	<b>22.78%</b>	<b>23.70%</b>	<b>16.44 %</b>	<b>9.15 %</b>

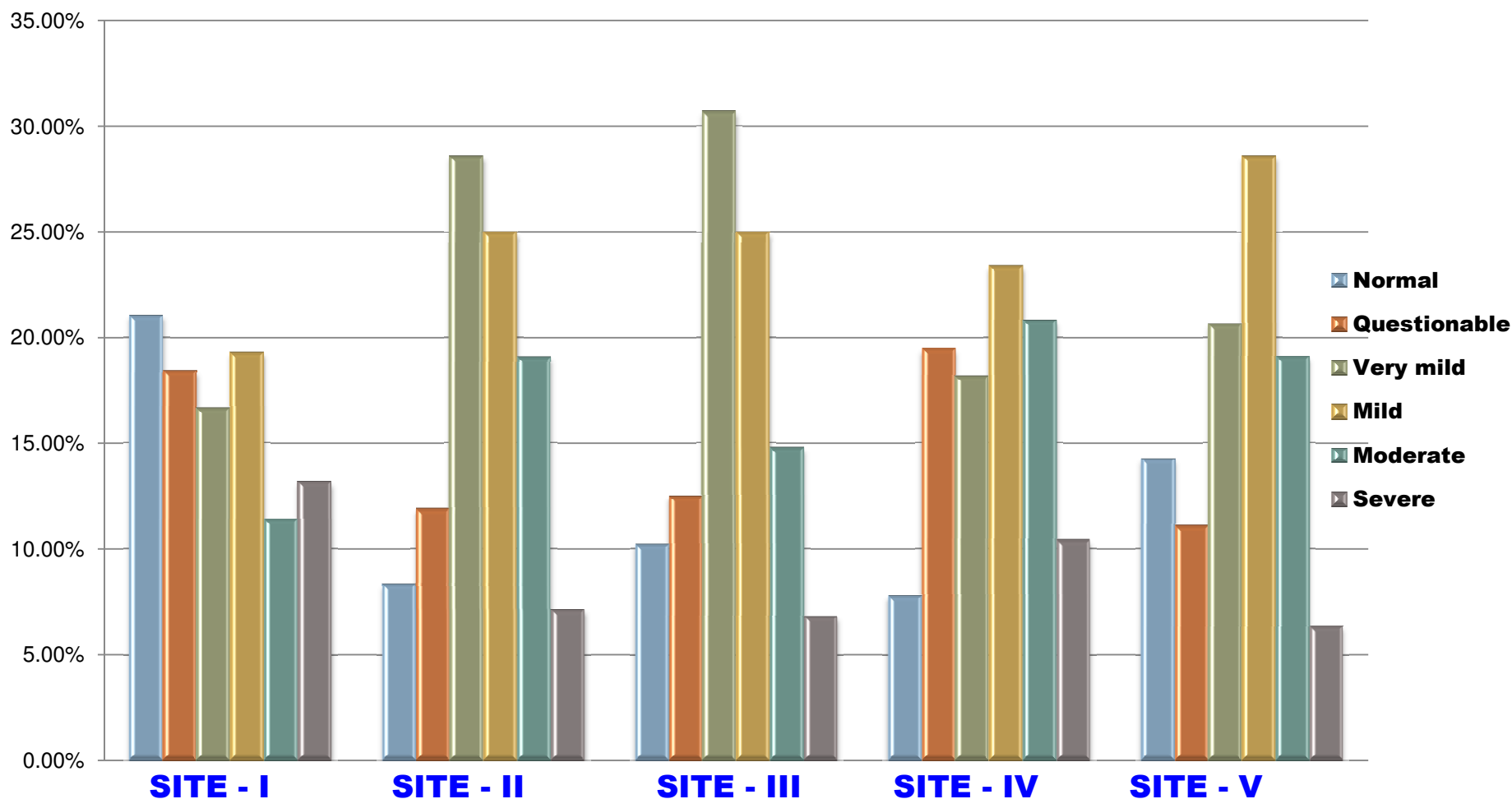
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**Fig. 2: Showing the seasonal variation of fluoride concentration of ground water in mg/lit. in Column**



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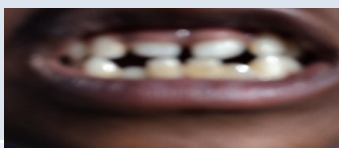


**Fig. 3: Showing the degree of fluorosis on children's teeth in Column**



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**Fig. 4: Showing the comparison of teeth of children of the study area with Dean's Index to identify the degree of fluorosis**

Sl. No.	Category of Dean's Index	Characters	Dean's Index Teeth	Observation of the teeth
01	<b>Normal</b>	Enamel is smooth and uniform in color		
02	<b>Questionable</b>	Enamel may exhibit some white flecks or small white spots. These are cases where there is not definitive fluorosis, but teeth do not qualify as "normal" either.		
03	<b>Very mild</b>	Less than 25% of the tooth surfaces display irregular white areas. Often these include cases where there are 1-2 mm of the tooth surface just at the cusp tips are affected.		
04	<b>Mild</b>	More than 25% of the tooth surface but less than 50% is affected.		
05	<b>Moderate</b>	Generalized areas of hypo calcification on all surfaces of the tooth, may exhibit attrition on susceptible tooth surfaces and brown spots may be present.		
06	<b>Severe</b>	Generalized pitting of the enamel on all surfaces, generalized brown discolorations, tooth shape may be affected as well.		

## DISCUSSION

- ALL THE WATER SAMPLES SHOWED HIGHER CONCENTRATION OF FLUORIDE THROUHT THE YEAR (RANGE  $1.65 \pm 0.5$  TO  $4.9 \pm 0.8$ mg/lit.)
- THE HIGHER FLUORIDE CONCENTRATION IN THE STUDY AREA IS PROBABLY DUE TO EXCESS EXPLOSION AND MINERAL EXPLOITAION.
- STUDY ON 152 SCHOOL CHILDREN REVEALS THAT ABOUT 87% CHILDREN HAVING DENTAL FLUOROSIS.
- BOTH THE RESULTS INDICATE THAT DENTAL FLUOROSIS IS DIRECTLY RELATED TO FLUORIDE CONCENTRATION IN POTABLE WATER.

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## CONCLUSION

- ❑ WATER IS LIFE, BUT UNFORTUNATELY QUALITY POTABLE WATER IS NOT AVILABLE AS PER REQUIRENENT IN THE STUDY AREA.
- ❑ ROUTINE MOINITORING OF POTABLE WATER SHOULD BE DONE BY STATE, CENTRAL GOVT. OR NGOs ETC.
- ❑ EFFECTIVE UNIT OF ORAL HEALTH AND HYGIENE SHOULD BE ESTALISHED IN THE AREA FOR REGULAR QUALITY CHECKUP AND MASS AWARENESS.

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**THANKS**