



RESEARCH ARTICLE

ASSESSMENT OF DENTAL CARIES USING CAST INDEX AMONG SCHOOL GOING CHILDREN OF AGE 12-15 YEARS IN KHAMMAM, TELANGANA STATE. A CROSS SECTIONAL STUDY

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Abstract

Background: Man has been afflicted by dental caries since time immemorial. Epidemiological studies have revealed that dental caries is the most prevalent chronic disease in pediatric community and is still a major health problem in most industrialized countries as it affects 60-90% of school aged children and vast majority of adults. CAST Index covers the whole spectrum of dental caries starting from sound tooth up to eventual tooth loss.

Aim: To assess the prevalence of dental caries using CAST index in 12 to 15 years of school going children.

Material and methods: A cross sectional descriptive study was conducted among school going children of age 12-15 years old in Khammam city, Telangana state, India. Out of 12 Government schools and 78 Private schools in all the four regions (North, South, East, West) of Khammam city, randomly eight schools (4 private and 4 government schools) from four regions (1 private and 1 government school from each region) have been selected by a lottery method. Finally from each selected school, every odd roll number child between 12-15 years, were enrolled to reach a sample size of 452. Caries was recorded using the CAST Index. Each child was clinically examined by a trained examiner using CAST Index. Data was entered in Microsoft excel sheet 2007 and descriptive statistics done using SPSS software.

Results: A total of 452 children were examined and the overall prevalence of dental caries was found to be 41.81% with highest in the age group of 14 years (46.15%) followed by 12 years (41.44%), 13 years (40%) and 15 years (39.45%).

Conclusion: CAST Index presents a simple hierarchical structure of caries spectrum and is a promising index for epidemiological studies and has introduced a new paradigm by reassessing the pathogenesis of dental caries.

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Introduction:-

Man has been afflicted by dental caries since time immemorial.¹ Dental caries is a complex disease affecting the teeth, which is mainly caused by imbalance between demineralization and remineralization process around the tooth surface.² Dental caries remains a major public health problem on the community level and continues to be a source of pain, suffering and low quality of life on an individual level. Epidemiological studies have revealed that dental caries is the most prevalent chronic disease in pediatric community and is still a major health problem in most industrialized countries as it affects 60-90% of school aged children and vast majority of adults.²

Many tools for the assessment of dental caries have been presented to dental professionals and dental program planners for recording the caries status. Among these, the most widely used was the decayed, missing and filled teeth index (DMFT), recommended by the World Health Organization (WHO). Even though the index had its strengths, yet the D component showed a wide range of variation. The need to monitor and assess the severity of the D component of the DMFT index in recent decades was the main reason for researchers to develop the International Caries Detection and Assessment System (ICDAS). The ICDAS system had an advantage of helping to distinguish three stages of caries severity in enamel, but it required complete dryness of the tooth surface using dry air and double checking which rendered surveys to be more time and money consuming. The drawback of this index were covered in another index called PUFA which was developed to assess the severe course of untreated dental caries, the Pulpal Involvement Ulceration Fistula Abscess. But the disadvantage is that it covers a limited area of the wide range of caries process letting them act complementary to DMFT and ICDAS.

From the clinical perspective as well as in the epidemiological point of view, it is always advantageous to implement a single simple index to monitor the whole spectrum of a disease. So, in 2011, Jo E. Frencen, Rodrigo G. de Amorim, Jorge Faber and Soraya C. Leal developed the Caries Assessment Spectrum and Treatment (CAST) index. An advantage of CAST is that it counts successfully restored teeth as a sound teeth which is an epidemiologically acceptable concept of health. It covers the whole spectrum of dental caries starting from sound, preventive, restorative, to caries in enamel and dentin, reaching to the advanced stages of untreated lesions of pulpal involvement and surrounding tooth structures up to eventual tooth loss. CAST codes follow a hierarchical manner describing the increased caries severity and additionally contain all the WHO caries assessment criteria.³

However, very few studies in India on caries pattern covering full spectrum could be found in the available literature. So, the present study was conducted to assess the prevalence of dental caries using CAST index in 12 to 15 years of school going children. The objectives of the study are to evaluate the prevalence of dental caries by the use of CAST index among 12-15 year old school children of Khammam, to compare the caries spectrum according to age, gender and type of school and to provide baseline data for the policy makers to have a complete picture of the caries situation for planning and management.

Material and Methods:-

A cross sectional descriptive study was conducted among school going children of age 12-15 years old in Khammam city, Telangana state, India. Ethical clearance was obtained from ethical committee of institution (EC_IRB NO:MDC_KT_16208103041) before the commencement of study. An official permission was obtained from the District Education Officer and also from all the concerned school authorities. The school authorities were explained about the purpose of the study and written informed consent from each study participant was obtained prior to the oral examination. Children who were with systemic diseases, orthodontic braces and who were not willing to participate were excluded from the study.

Prior to conducting the study, the investigator was calibrated and trained in the department of public health dentistry, Mamata Dental College, Khammam, to limit intra-examiner variability. To check the feasibility of the study, a pilot study was conducted on randomly selected 60 children aged 12-15 years from the list of available schools. No data from the subjects included in the pilot study was included in the main study. Depending upon the prevalence obtained in pilot study, sample size was calculated using the formula $N = (Z^2 \alpha / 2 \times P) 1 - P \times D / E^2$ and the sample size was obtained to be 452.

The list of total number of private and government schools in khammam city were obtained from the District educational officer. As per the list there are 12 Government schools and 78 Private schools in all the four regions (North, South, East, West) of Khammam city. Randomly eight schools (4 private and 4 government schools) from

four regions (1 private and 1 government school from each region) have been selected by a lottery method. Finally from each selected school, every odd roll number child between 12-15 years, were enrolled to reach a sample size of 452. Data collection was done from 18th July 2018 to 11th August 2018. Twenty five children were examined in a day. Dental examination was carried out by a single investigator and a recording assistant was involved to enter the codes on the survey form.

Demographic details of children were recorded including age and gender. Caries was recorded using the CAST index, which was carried out for all the teeth in children mouth. Type III examination was done using mouth mirror and WHO probe. Disposable mouth masks and gloves were worn by examiner during examination. Autoclaved clinical examination instruments of 25-30 sets were carried for inspection. Data was entered in Microsoft excel sheet 2007 and descriptive statistics done using SPSS software.

Results:-

Table 1:- Codes and description of CAST index.

0	Tooth	Sound No visible evidence of a carious lesion is present
1	Sealed	Sealed Pits and Fissures have been at least partially covered with a sealant material
2	Restored	Restored A cavity has been restored with an (in)direct restorative material, currently without a dentine carious lesion and no fistula/abscess present
3	Enamel	Distinct visual change in enamel A clear carious related discoloration (white or brown in color) is visible, including localized enamel breakdown without clinical visual signs of dentinal involvement
4	Dentine	Internal caries-related discoloration in dentine The lesion appears as shadows of discolored dentin visible through enamel which may or may not exhibit a visible localized breakdown
5	Dentine	Distinct cavitation into dentine. No (expected) pulpal involvement is present
6	Pulp	Involvement of pulp chamber Distinct cavitation reaching the pulp chamber or only root fragments are present
7	Pulp	Abscess /Fistula A pus containing swelling or a pus releasing sinus tract related to a tooth with pulpal involvement is present
8	Lost	The tooth has been removed because of dental caries
9	Other	Does not match with any of the other categories
A	Absent	The tooth has not been erupted.

Table 2:- Demographic characteristics of the participants.

Characteristics	No of participants	% of participants
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Age		
12 years	111	24.56
13 years	115	25.44
14 years	117	25.88
15 years	109	24.12
Gender		
Males	212	46.90
Females	240	53.10
Type of school		
Government school	226	50.00
Private school	226	50.00
Total	452	100.00

Age: Most of the children were in the age group of 14 years (25.88%). **Gender:** Mostly there were Females(53.10%) **Type of school:** Children are equally distributed from both private and the government schools.

Table 3:- Distribution of the participants among 12- 15 years of age according to gender.

Age	Males	%	Females	%	Total	%
12 years	58	27.36	53	22.08	111	24.56
13 years	57	26.89	58	24.17	115	25.44
14 years	38	17.92	79	32.92	117	25.88
15 years	59	27.83	50	20.83	109	24.12
Total	212	100.00	240	100.00	452	100.00

Most of the Males were in the age group of 15 years (27.83%) Most of the Females were in the age group of 14 years (32.92%)

Table 4:- Distribution of participants among 12-15 years of age according to type of school.

Type of school	Males	%	Females	%	Total	%
Government school	109	51.42	117	48.75	226	50.00
Private school	103	48.58	123	51.25	226	50.00
Total	212	100.00	240	100.00	452	100.00

Most of the Males are from Governmentschools (51.42%). Most of theFemalesare from Private schools (51.25%).

Table 5:- Distribution of teeth affected with CAST codes according to Age.

CAST codes	12 years		13 years		14 years		15 years		Total		p-value
	No of teeth	%	No of teeth	%	No of teeth	%	No of teeth	%	No of teeth	%	
Code 0	2827	22.33	3042	24.03	3088	24.39	2914	23.02	11871	93.79	0.0001 *
Code 1	3	0.02	11	0.086	17	0.13	12	0.09	43	0.33	0.2932
Code 2	12	0.09	17	0.13	37	0.29	29	0.22	95	0.75	0.0170 *
Code 3	48	0.37	52	0.41	89	0.70	52	0.41	241	1.90	0.0334 *
Code 4	11	0.08	13	0.10	24	0.18	24	0.18	72	0.56	0.0533
Code 5	7	0.05	6	0.04	5	0.03	6	0.04	24	0.18	0.9324
Code 6	5	0.03	5	0.03	7	0.05	9	0.07	26	0.20	0.6330
Code 7	2	0.015	0	0.00	0	0.00	0	0.00	2	0.01	0.1038
Code 8	0	0.00	1	0.007	0	0.00	1	0.007	2	0.01	0.5649
Code 9	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	

*p<0.05

Table 6:- Distribution of teeth affected with CAST codes according to Gender.

CAST codes	Males		Females		Total		p-value
	No of teeth	%	No of teeth	%	No of teeth	%	
Code 0	5521	43.62	6350	50.17	11871	93.79	0.0295*
Code 1	13	0.10	30	0.23	43	0.33	0.1534
Code 2	50	0.39	45	0.35	95	0.75	0.3663
Code 3	128	1.01	113	0.89	241	1.90	0.1490
Code 4	30	0.23	42	0.33	72	0.56	0.3890
Code 5	9	0.07	15	0.11	24	0.18	0.3643
Code 6	14	0.11	12	0.09	26	0.20	0.4991
Code 7	2	0.01	0	0.00	2	0.01	0.1321
Code 8	1	0.00	1	0.00	2	0.01	0.9301
Code 9	0	0.00	0	0.00	0	0.00	--

*p<0.05

Table 7:- Distribution of teeth affected with CAST codes according to Type of school.

CAST codes	Government		Private		Total		p-value
	No of teeth	%	No of teeth	%	No of teeth	%	
Code 0	5804	45.85	6067	47.93	11871	93.79	0.0001*
Code 1	22	0.17	21	0.16	43	0.33	0.9209
Code 2	48	0.37	47	0.37	95	0.75	0.9340
Code 3	142	1.12	99	0.78	241	1.90	0.0383*
Code 4	44	0.34	28	0.02	72	0.56	0.0677
Code 5	19	0.15	5	0.00	24	0.18	0.0048*
Code 6	16	0.12	10	0.07	26	0.20	0.2621
Code 7	2	0.01	0	0.00	2	0.01	0.1571
Code 8	1	0.00	1	0.00	2	0.01	1.0000
Code 9	0	0.00	0	0.00	0	0.00	--

*p<0.05

Table 8:- Distribution of children affected with CAST codes according to Age.

CAST codes	12 years		13 years		14 years		15 years		Total	
	N	%	n	%	n	%	n	%	n	%
Code 1	2	1.8	4	3.5	9	7.7	8	7.3	22	4.9
Code 2	10	9.0	13	11.3	26	22.2	19	17.4	68	15.0
Code 3	33	29.7	37	32.2	40	34.2	32	29.4	142	31.4
Code 4	10	9.0	11	9.6	22	18.8	21	19.3	64	14.2
Code 5	7	6.3	5	4.3	5	4.3	6	5.5	23	5.1
Code 6	5	4.5	4	3.5	7	6.0	8	7.3	24	5.3
Code 7	2	1.8	0	0.0	0	0.0	0	0.0	2	0.4
Code 8	0	0.0	1	0.9	0	0.0	0	0.0	1	0.2
Code 9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Table 9:- Distribution of children affected with CAST codes according to Gender.

CAST codes	Males		Females		Total	
	n	%	n	%	N	%
Code 1	8	3.77	14	5.83	22	4.87
Code 2	34	16.04	34	14.17	68	15.04
Code 3	73	34.43	69	28.75	142	31.42
Code 4	28	13.21	36	15.00	64	14.16
Code 5	8	3.77	15	6.25	23	5.09
Code 6	13	6.13	11	4.58	24	5.31
Code 7	2	0.94	0	0.00	2	0.44
Code 8	1	0.47	0	0.00	1	0.22

Code 9	0	0.00	0	0.00	0	0.00
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Table 10:- Distribution of children affected with CAST codes according to Type of school.

CAST codes	Government		Private		Total	
	N	%	n	%	N	%
Code 1	11	4.87	11	4.87	22	4.87
Code 2	35	15.49	33	14.60	68	15.04
Code 3	80	35.40	62	27.43	142	31.42
Code 4	39	17.26	25	11.06	64	14.16
Code 5	18	7.96	5	2.21	23	5.09
Code 6	16	7.08	8	3.54	24	5.31
Code 7	2	0.88	0	0.00	2	0.44
Code 8	1	0.44	0	0.00	1	0.22
Code 9	0	0.00	0	0.00	0	0.00

Table 11:- Prevalence of dental caries according to Age.

Age	With Enamel caries	%	With Dentinal caries	%	With Pulpal caries	%	With Dental Caries	%	p-value
12yr	33	29.73	17	15.32	7	6.31	46	41.44	0.7249
13yr	37	32.17	14	12.17	4	3.48	46	40.00	
14yr	40	34.19	25	21.37	7	5.98	54	46.15	
15yr	32	29.36	26	23.85	8	7.34	43	39.45	
Total	142	31.41	82	18.14	26	5.75	189	41.81	

Enamel caries: 14 years (34.19%). **Dentinal caries:** 15 years (23.85%).

Pulpal caries: 15 years (7.34%). **DENTAL CARIES:** 14 years (46.15%).

Table 12:- Prevalence of dental caries according to Gender.

Gender	With Enamel Caries	%	With Dentinal caries	%	With Pulpal caries	%	With dental caries	%	p-value
Males	73	34.43	33	15.57	15	7.08	90	42.45	0.7959
Females	69	28.75	49	20.42	11	4.58	99	41.25	

*p<0.05

Enamel caries: Males (34.43%). **Dentinal caries:** Females (20.42%).

Pulpal caries: Males (7.08%). **DENTAL CARIES:** Males (42.45%)

Table 13:- Prevalence of dental caries according to Types of school.

Type of school	With Enamel caries	%	With Dentinal caries	%	With Pulpal caries	%	With Dental Caries	%	p-value
Govt school	80	35.40	53	23.45	18	7.96	105	46.46	0.0452
Private school	62	27.43	29	12.83	8	3.54	84	37.17	

*p<0.05

Enamel caries: Government school (35.40%). **Dentinal caries:** Government school (23.45%). **Pulpal caries:** Government school (7.96%). **DENTAL CARIES:** Government school (46.46%)

Table 14:- Components of CAST index according to Age.

Age	Total no. of children	With Restoration (code 1,2)	Code 3 (Pre morbidity)	Code 4,5 (morbidity)	Code 6,7 (Severe morbidity)	Code 8 (mortality)
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		n	%	n	%	n	%	n	%	n	%
12 years	111	11	9.91	33	29.72	17	15.31	7	6.30	0	0.00
13 years	115	16	13.91	37	32.17	14	12.17	4	3.47	1	0.87
14 years	117	32	27.35	40	34.18	25	21.36	7	5.98	0	0.00
15 years	109	22	20.18	32	29.35	26	23.85	8	7.33	1	0.92
Total	452	81	17.92	142	31.41	82	18.14	26	5.75	2	0.44

Filled teeth: 14 years (27.35%). **Pre morbidity:** 14 years (34.18%). **Morbidity:** 15 years (23.85%). **Severe morbidity:** 15 years (7.33%). **Mortality:** 15 years (0.92%).

Table 15:- Components of CAST index according to Gender.

Gender	Total no. of children	With Restoration (code 1,2)		Code 3 (Pre morbidity)		Code 4,5 (morbidity)		Code 6,7 (Severe morbidity)		Code 8 (mortality)	
		n	%	n	%	n	%	n	%	n	%
Males	212	37	17.45	73	34.43	33	15.57	15	7.08	1	0.47
Females	240	44	18.33	69	28.75	49	20.42	11	4.58	1	0.42
Total	452	81	17.92	142	31.41	82	18.14	26	5.75	2	0.44

Filled teeth: Females (18.33%). **Pre morbidity:** Males (34.33%). **Morbidity:** Females (20.42%). **Severe morbidity:** Males (7.08%). **Mortality:** Males (0.47%).

Table 16:- Components of CAST index according to Type of school.

Type of school	Total no. of children	With Restoration (code 1,2)		Code 3 (Pre morbidity)		Code 4,5 (morbidity)		Code 6,7 (Severe morbidity)		Code 8 (mortality)	
		N	%	N	%	N	%	N	%	N	%
Government school	226	40	17.7	80	35.40	53	23.45	18	7.96	1	0.44
Private School	226	41	18.14	62	27.43	29	12.83	8	3.54	1	0.44
Total	452	81	17.92	142	31.42	82	18.14	26	5.75	2	0.44

Filled teeth: Private school children (18.14%). **Pre morbidity:** Government school children (35.40%). **Morbidity:** Government school children (23.45%). **Severe morbidity:** Government school children (7.96%).

The study population consists of 12-15 years old school going children in private and government schools of Khammam city, Telangana state.

Table-1 depicts the criteria and scores of CAST index. Table- 2 depicts the distribution of the study participants. Majority of the school children were in the age group of 14 years (25.88%). Based on gender, most of the school children are females (53.10%). Based on type of school, children are equally distributed from both private and the government schools (50%). Table-3 depicts the distribution of the participants among 12-15 years of age according to gender. Majority of males were in the age group of 15 years (27.83%). Most of the females were in the age group of 14 years (32.92%). Table-4 depicts the distribution of the participants among 12-15 years of age according to type of school. Mostly there were males reported from government school (51.42%). Most of the females are from private school (51.25%).

Discussion:-

Dental caries is a multi-factorial, microbial, infectious, transmissible disease of hard tissues of teeth characterized by the demineralization of inorganic structures and subsequent breakdown of organic structures along with remineralization of the demineralized structures until there is cavitation. Various authors have postulated a plenty of influencing factors regarding its etiology. Socioeconomic status, availability of the sticky carbohydrate containing foods, dietary intake of fibrous foods, the presence of fluoride or other micronutrients in diet, sugar intake, frequency and oral hygiene maintenance all have some extent influence over the causation of dental caries.⁴

The contemporary concepts of caries indices are based on the idea of incorporation of all caries stages into one tool. Among many systems, the CAST index stands out with its simple hierarchical structure, including the full spectrum of the disease, the categorization of the caries process according to its progression and a modern approach to filled teeth due to their inclusion in the category of sound teeth. CAST is a promising index for epidemiological research studies because the instrument allows obtaining more detailed data on caries prevalence and experience than DMFT. Moreover, its use during a survey should be less costly and time-consuming compared to the use of ICDAS; however, such advantages need to be proven from substantial to almost perfect depending on the age of participants.

A cross sectional epidemiological study to assess the prevalence of dental caries using CAST index was conducted on 452 school going children, including males and females, aged 12-15 years studying in both government and private schools of Khammam city. In the present study, schools were chosen for the reason as it provides a platform for the promotion of health and oral health for the students.

Children of 12 to 15 years were chosen, as this was the time, majority of permanent teeth would have been erupted and this is the period where the risk of developing caries is highest. In the present study, 25.88% numbers of children were present in the age group of 14 years and the study participants included various socioeconomic and cultural backgrounds belonging to both government and private schools.

The present study used CAST index for the assessment of caries in the study population. In most of the countries the results of studies investigating caries experience are predominantly expressed in mean dmf/DMF scores and many of such studies have applied the WHO criterion. Therefore, these studies are considered as references for the present study. Although it appears that a mean dmf/DMF score can be retrieved from the data collected through the use of CAST, this assumption has not been investigated and reported. As CAST and WHO caries detection criteria differ significantly in their descriptions, reporting of results is found to be presented in different ways.

In the present study, it was found that the number of female (53.10%) subjects was comparatively higher as compared to males (46.90%) whereas in the study conducted by RadheyShyam et al (2017)¹ more number of males (53.75%) were observed than females (27.13%).

According to the present study, the overall prevalence of dental caries was found to be 41.81% which is in accordance with the study conducted by Abhishek Mehta(2018)⁵ which is of 45.9% and in our study, prevalence of dental caries was found highest in the age group of 14 years (46.15%) followed by 12 years (41.44%), 13 years (40%) and 15 years (39.45%) of age group, which is almost similar in all the age groups, whereas in the study conducted by RadheyShyam et al (2017)¹ the results has shown that the dental caries prevalence was not significantly related among different age groups and this might be due to high dental caries in the pre-teen to teen-aged population, including changing life styles and inadequate awareness of good oral health.

In the present study, the prevalence of dental caries was found almost similar in males (42.45%) and females (41.25%) this may be due to the same dietary habits and regular snacking. Which is in contrast with the findings reported by Shingare et al (2012)⁶

According to the findings of the present study, caries prevalence was higher among government school children (46.46%) as compared to private school children (37.17%) and is in accordance with the findings of Anachala k et al(2016)⁷ The higher level of caries in government schools, it may be due to lack of availability of dental care, postponement of treatment because of cost considerations, underutilization of available facilities and lack of awareness regarding the importance of timely dental care.

In the present study, the prevalence of enamel caries and dentinal caries was found to be 31.41% and 18.14%, respectively, whereas in the study conducted by the AnaPaula D. Ribeiro et al (2017)⁸, the prevalence of enamel and dentinal carious lesions were 38.18% and 8.81% respectively. This was slightly in accordance with the present study, and the possible reason for the caries prevalence could be due to, the absence of good oral health habits in children, high sugar consumption and inadequate knowledge about brushing techniques.

In the age group of 12 to 15 years, the caries prevalence and caries experience obtained through use of the CAST instrument can be compared with those obtained through using the WHO criterion if we consider code 4-7 as decayed, code 2 as filled and code 8 as missing. A previously published study on occlusal surfaces of permanent

first molars of 6-8 year old children appear to confirm this finding. Whether the high level of similarity between CAST and WHO criterion is also present in other age groups and in populations with different treatment patterns is unknown and needs to be investigated. For example, in a population with a high prevalence of restored teeth that also contain enamel caries lesions, a single tooth is categorized as restored according to the WHO criterion, while such a tooth is categorized as an enamel caries lesion when CAST is used. This difference is due to the hierarchical order within CAST that considers a tooth containing an enamel caries lesion as in a more severe condition than a restored tooth. This novelty in CAST might affect the level of agreement in DMFT counts between the two caries assessment instruments and is dependent upon the frequency of occurrence of combinations of caries codes in a tooth.

The contemporary concepts of caries indices are based on the idea of incorporation of all caries stages into one tool. Among many systems, the CAST index stands out with its simple hierarchical structure, including the full spectrum of the disease, the categorization of the caries process according to its progression and a modern approach to filled teeth due to their inclusion in the category of sound teeth. CAST is promising index for epidemiological research studies because the instrument allows obtaining more detailed data on caries prevalence and experience than DMFT. Moreover, its use during a survey should be less costly and time consuming compared to the use of ICDAS, however such advantages need to be proven in future studies, so far, the reproducibility of CAST in clinical studies was assessed to be from substantial to almost perfect depending on the age of participants.

The prevalence of a disease or condition is determined by the number of individuals in a population affected by that disease or condition. Prevalence may vary, depending on the cause of the disease/ condition and the effect of treatment rendered. However the prevalence of dental caries currently is determined in a different way. Not only is the prevalence based on individuals affected by the disease, it is also based on individuals who had been affected and received treatment. This is because the calculation of the prevalence of dental caries is based on the DMFT counts of individuals who constitute the population under study. Therefore, merely using the DMFT count in calculating the prevalence of dental caries provides an erroneous picture of the actual situation of the disease in an individual. Individuals who have had a stable dentition with three restorations and some enamel caries lesions that never progressed into cavitation over a period of 40 years are not considered healthy, according to the calculations currently in use for determining the prevalence of dental caries. The dental profession has been using this approach, most probably since the introduction of the DMFT index by Klein and palmer and is still in use. It goes without saying that the traditional way of calculating the prevalence of dental caries does not depict well the efforts made by the dental community in serving the population, as a lower prevalence cannot be shown post treatment. This way of calculating the prevalence of dental caries is unwarranted and ought to be rectified. In an attempt to achieve greater accuracy CAST was developed. In this assessment instrument, only teeth that have a cavitated dentin caries lesion and those that show its consequences (CAST codes 5-7) are considered diseased and included in the calculation of the prevalence of dental caries. A restored tooth and an extracted tooth are not included, because the first one has been treated and the second one is not considered diseased anymore. Following this rationale, a population that, e.g, had a prevalence of dental caries of 45 percent before undergoing treatment, will reach a prevalence of below 45 percent after treatment, showing the effect of the treatments rendered.

The findings of the present study show that there were a higher number of children affected with enamel caries lesion (31.4%) requiring extra surface protection with a sealant and / or fluoride treatment. Therefore, using CAST allows health authorities to plan oral health care programs better than the WHO criterion makes possible. The results of the present study showed a low proportion of children having teeth affected with a caries lesion reaching the pulp, which in most cases would require an extraction.

Thus, reporting of the caries status according to CAST allows for the presentation of a pre-morbidity stage that calls for preventive action. Furthermore, CAST also distinguishes dentine caries lesions that can be restored from those that are beyond treatment with a restoration alone. These caries conditions are not included in the WHO criterion, which is a disadvantage. For example, the epidemiological survey, which is conducted in Brazil, which used the WHO criterion, concluded that about 80% of decayed primary teeth in 5- year- olds remained untreated. Having these results as a reference, health planners is unable to provide a realistic overview of the kind of treatments needed and consequently, cannot accurately calculate the amount of (restorative) dental material, instruments, equipment and budget required to improve the situation adequately. According to the present study findings the treatment requirements can be translated from the relative status of the dentition. 93.79% of the teeth are in a healthy dentition and it requires maintenance through twice daily cleaning of teeth with a toothbrush and fluoride

containing toothpaste. 31.41% of the children are in a pre-morbidity dentition situation and it requires preventive measures like extra surface protection with a sealant or application of fluoride treatment, health education and regular surveillance. 18.14% of the children are in Dentition with morbidity situation which requires intra or extra coronal restoration or an ultra-conservative treatment. 5.75% of the children are in Dentition with severe morbidity and it requires pulpotomy or extraction. 0.44% of the children are in Mortality in dentition and it requires replacement of the missing teeth. It goes without saying that children with diseased dentition need to maintain their teeth, using a toothbrush and fluoride - containing toothpaste and that parent should consider their diet.

The symmetry of caries distribution was not previously assessed with regard to the full spectrum of severity of the caries process. Therefore, using CAST index provides details on the severity of the dental caries and the treatment modalities accordingly, thereby allowing health authorities to have an available tool that enables them to plan oral health care programs better than the WHO criterion.

Conclusion:-

The prevalence of dental caries was found to be 41.81% in the study samples and is mostly seen in the 14 years of age group, and the highest number of children were affected with enamel caries requiring extra surface protection with a sealant and/or fluoride treatment. Similarly the children requiring pulp therapy or extraction were more in the 15 years of age group. The prevalence of dental caries was more among government school children (46.46%) as compared to private school children (37.17%). Prevalence of dental caries was almost found similar in males (42.45%) and females (41.25%).

So, there is a need for creating awareness regarding proper brushing techniques, dietary habits, conducting school dental health education, and preventive programs. School teachers should also be educated, who in turn can guide the children and motivate about the importance of oral hygiene.

Proper planning and implementation is required to introduce primary prevention and increase restorative care for the purpose of both reducing the caries prevalence and maintaining those caries free children as the ultimate goal to produce a caries free childhood.

The present study evaluated the prevalence of dental caries using CAST index, which presents a simple hierarchical structure of caries spectrum and is a promising index for epidemiological studies. CAST index has introduced a new paradigm by reassessing the pathogenesis of dental caries. It has not presented an overestimated caries prevalence suggesting the potential of CAST index for scoring the whole spectrum of dental caries.

Limitations:-

Notwithstanding the strengths of the present study, clear limitations are also identified. It is therefore appropriate to discuss these limitations, and any effects of these limitations on the results, interpretations and conclusions.

1. Since the present study was a field survey therefore radiographs were not used in the diagnosis or detection of interproximal caries. It is likely, That the prevalence of dental caries may have been underestimated.
2. In the present research only affected teeth were recorded, without determining the tooth surface affected by caries. Additional studies that include surfaces involved should be conducted.
3. It was beyond the scope of the present study to assess the ecological factors predisposing to dental caries among 12 to 15 years school children therefore there is a scope for future study.
4. The study design was cross sectional, therefore evidence regarding casual relationships could not be confirmed. Undoubtedly further longitudinal studies are required to overcome these limitations. Therefore the data derived from our analysis should be interpreted with caution, considering all previous limitations.

Recommendations:-

The dental caries increase would be due to lack of dental awareness, improper brushing techniques, improper dietary habits, ignorance and lack of motivation. Oral health promotion through integrated school health programs including oral screening preventive programs like fluoride mouth rinse etc, and health education of school students should be taken up on regular intervals for education and creating awareness regarding oral health maintenance. Various professional bodies and existing dental colleges can help the community in this regard.

The prevalence of dental caries in 12 to 15 years-old children in Khammam, as revealed by study is found to be 41.81%. To further improve the oral health of children in Khammam, we recommend the following:

1. Oral health promotion through well structured oral health education program can create positive changes in awareness of special groups like school children. Reinforcement of knowledge is necessary and this can be done by incorporating chapters on oral health and oral hygiene in schools textbooks. Also, the teachers training programs can ensure continuity of reinforcement.
2. Preventive services should be given high priority and needs to be started at an early age to target the primary dentition and future caries in permanent dentition.
3. Regular interval screening programs to assess the oral health and treatment needs of school children with treatment as per need.

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